Our 15th Year

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AMATEUR TELEVISION MAGAZINE

SEP/OCT 1981
VOL. 11 NO. 5

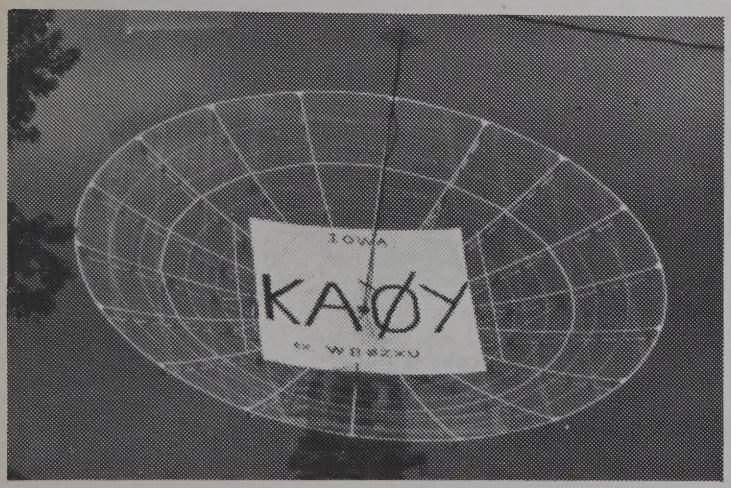
"FOR THE SPECIALIZED COMMUNICATION RADIO AMATEUR"

A5 MAGAZINE SOLD TO WBØQCD

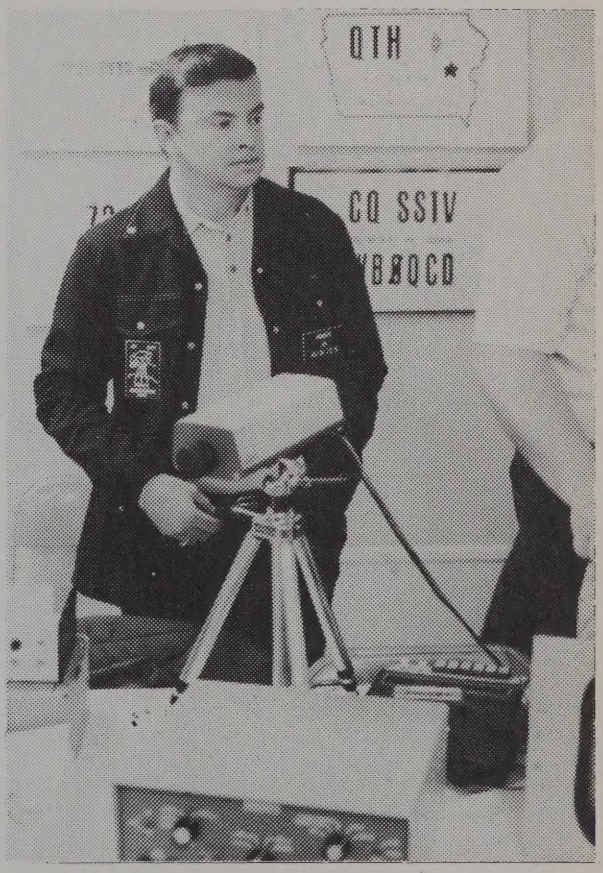
TRADITION TO CONTINUE WITH EXPANDED FORMAT

WBØQCD buys A5 Mag. from KB9FO

- All About Amateur Television KB9FO
- Video ID PROM Sequencer for ATV W6ORG
- 1296 Mhz. Omni-Gain Repeater Antenna
- SSTV Satellite Launch Information UOSAT
- Narrow Band Television Revival!
- EME Moonbounce Interview KAØY
- Introduction to RTTY - Chapter 1
- A5 Magazine Classified Ads!
- And Much More!



Weekend project?



ATV'er WBØKFB Cedar Rapids, Ia.

A5 AMATEUR TELEVISION MAGAZINE

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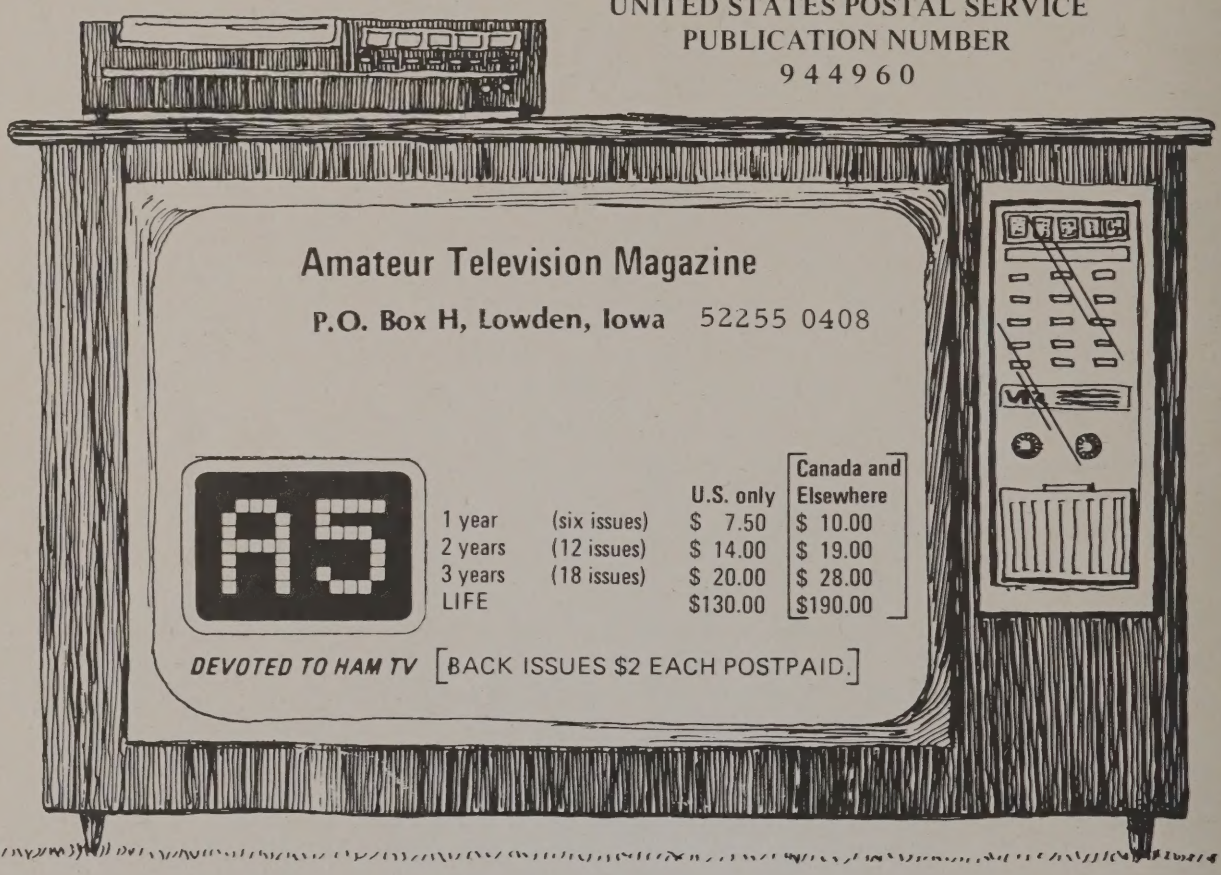
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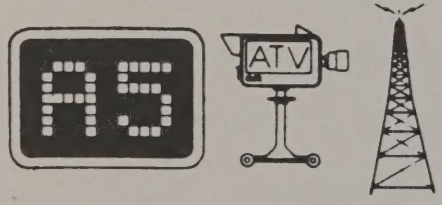


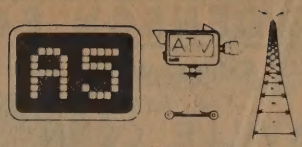
Amateur Television Magazine

Mike Stone, WBØQCD

P.O. Box H, Lowden, Iowa 52255

ATV Magazine and ATV In A Nutshell are now on permanent archives at the Library of Congress

Commentary



Publisher: Amateur Television Magazine

"SURPRISE!" DE WBØQCD your new editor/publisher of A5 TELEVISION MAGAZINE! The negotiations began back at the Dayton 81' hamvention, continued thru June over some tasty "Old Chicago" style barbecued ribs, and finalized June 18th with the exchange of the typewritter. As you regular subscribers already know, I have been writing an ATV/SSTV column for Henry on a regular basis. Henry and I have spent alot of time together the past couple years at various hamfests around the country. I guess it was a natural thing for Henry to slip the publishing business to me a little at a time? Whatever, I will try my best to continue on with the tradition that KB9FO and the others before him accomplished with A5 MAGAZINE for the past 15 years. You will notice that I am retaining the "original" look of the periodical that has been so successful & obtained respected recognition as a representative of specialized communication operators world wide. I am reconfirming that ATV and all modes of Amateur Television will remain as the heart of this publication. FSTV and its' offshoots is what separates our facet of the Amateur Radio hobby from the other modes. Recent interest in NBTV, MSTV and SSTV modes only strengthen the ATV ranks and A5 MAGAZINE will continue to be there-reporting and leading the way in the promotion of A5 TELEVISION! In addition to the ATV reporting, I would like to expand A5 MAGAZINE into other areas of specialized communications such as RTTY, MICROWAVE, EME, FAX, SATELLITES, NBTV, COMPUTERS, DIGITAL DATA, etc. A survey taken back in April this yr. of A5 readers, revealed that many of you are indeed into or at least showed interest in some of these other modes. A further March 81' QST survey conveyed of the responding members that less than 1% were active in ATV. It was not, however, brought out that 8% said that they will be active in ATV someday with a surprising 23% stating "some interest". Other than a few fine news letters and a declining RTTY periodical that is devoted to making profits rather than serving its' membership, it is therefore a natural for A5 MAGAZINE to represent all modes of Amateur Radio Specialized Communications. It is this so called minority that we are after (the cream of the crop) to encourage and promote our end of the hobby. I have talked with many of you and received many letters of encouragement towards the "new" format. This issue is designed to cover several of these areas, give it a chance and it'll grow on you! With favorable responses, more subscribers and supporting advertisers, I forsee in the not too distant future of near monthly issues with more pages per issue and COLOR pictures. I will push our column and article editors, advertisers and printer to get A5 MAGAZINE out on time more often, usually within the first week of the months' issue date. Your response to subscription renewels and article requests will aid in that matter.

You will see in future issues, some new advertisers and articles as well as a regular Classified section. We will take a look back in time at some reprinted articles by those who made the mode what it is today. You new SSTV'ers probably have never heard the names Copthorne MacDonald or Bill DeWitt. The work done only a few short years ago by Robert Suding and Dr. Don Miller has paved the road to the actual COLOR SSTV pictures being transmitted on the air today! Knowing your past gives you appreciation of the future. My first edition cannot go without mention of its' past owner Henry Ruh. Henry devoted alot of talent, hard work, long hours and personal finances to bring A5 MAGAZINE to the respected journal it is today. Henry will continue to be my chief advisor as well as article writer as he nears closer to his lifelong dream of building and owning his own commercial radio station back home. I know I speak for all as I wish Henry Ruh all the luck in the world in his future endeavours and a hearty "thanks" for all he has contributed to Amateur Television!

The NOV/DEC issue in 1980 featured 5NØDOG as "SSTV'er of the Year". The upcoming NOV/DEC issues will become SSTV specials. Great COLOR articles are being planned including the latest in COLOR SSTV with G3NOX, W9NTP, KD6HF and DL2RZ. K6AEP, our regular computer column editor, has a fantastic article on his latest programs for the 6809 based TRS-80 COLOR Computer System and how it can be used for two-way Rtty and SSTV! I only ask a few things of you the A5 "reader"; Check your subscription label date codes and take advantage of our 3 year plus 1 year renewel offer... it saves $$$! Send in pictures of your shacks, equipment, projects, etc. Write articles and product test reports on any new gear. Include me on any newsletter listings and Club activities. This is your A5 MAGAZINE and your input is a must!

In closing my opening "commentary", I wish to thank all A5 supporters worldwide. Special thanks to Ralph Tash of Des Plaines, Illinois for his generous trust and to my wife Rosemarie for allowing another "piece of Ham Radio" into the shack! Good Video..... Mike Stone WBØQCD

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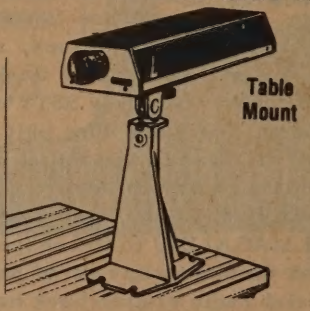

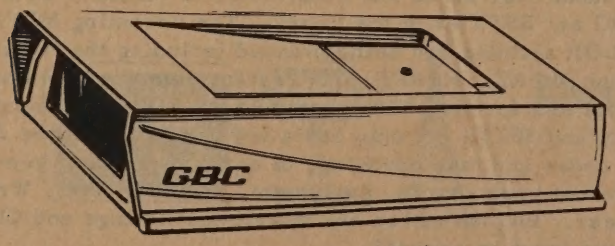

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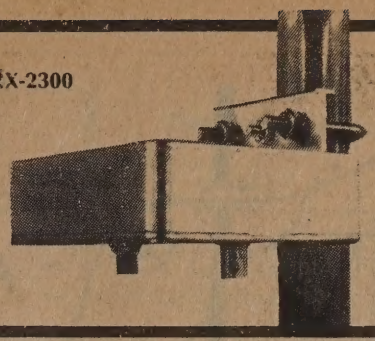

GENERAL SPECIFICATIONS:

Frequency Range: 1900 - 2700 Mhz input; 30 - 225 Mhz IF output; preset to convert the amateur band to TV channel 2, 3 or 4 (specify LOW) or channel 7, 8 or 9 (specify HIGH). The remote tuning range is plus/minus 15 Mhz

Performance: Front end device is rated **2.4 dB NF** at 2 Ghz; conversion gain is greater than 25 dB.

Power Requirements: + 12 to 17 VDC @ 30 ma. variable voltage; fed via the 75 ohm coaxial feedline.

Mechanical: Housed in a 3.6" × 4.5" × 1.1" cast metal enclosure; RF input connector is a BNC (Type N optional); output connector is a standard 75 ohm TV type F.

Antenna Requirements: Any good 2 Ghz 50 ohm horn, yagi, slotted array or parabolic dish type.

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Model PA-13-3:	**Model 2001:**
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PRICE: $40.00 + $1.00 shipping

HW-13: The hardware package includes a pre-drilled cast aluminium enclosure, quality connectors (BNC for RF input and a type F for the i-f output), mast clamp, and all miscellaneous parts.

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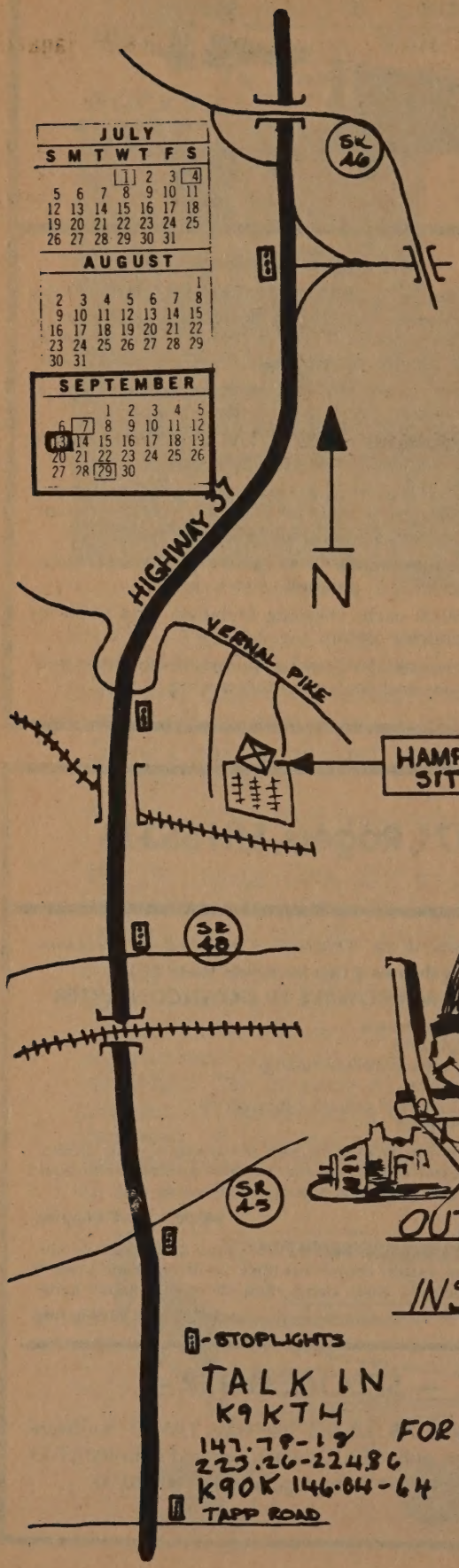

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NEWS by KB9FO
Contributing Editor
Amateur Television Magazine

Amateur Television Magazine

PUBLICATIONS:

MOTOROLA RF DATA MANUAL: The new 2nd Edition is now out and it's much thicker. Additions: 251 more devices and 10 application notes, varicap diodes, hot carrier diodes, pin diodes, and RF FETS. I don't know when Radio Shack will have them or how much. If you can't wait, write Motorola Literature Distribution Center, PO Box 20912, Phoenix, Arizona 85036. Or call Hamilton at 213-558-2651.

RSGB UHF/VHS MANUAL: You can order the 3rd edition from the Ham Radio Book Store by calling the toll free number, 1-800-258-5353. Actually, they cover so many different publishers that it's easier to call in your book orders this way than take a chance at a wasted trip to the local ham store. Anyway, this book is the bible of the weak signal 432 and 1296 people as far as amps and antennas. It contains articles on 2C39 flat line amps for 432 and 1296 and higher. Lots of good antenna info such as the original design on the quagi, J Beam, and loop yagis. Good articles on what noise figure and noise temperature mean in reality.

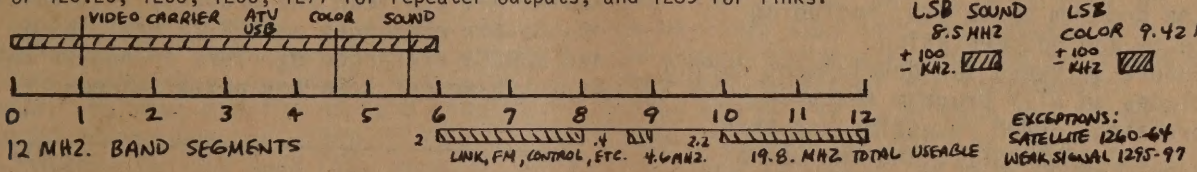
MEASUREMENTS:

FOR THE BIRDS: You can use your Bird wattmeter 25 Watt slug (25#) to give a close reading with your 1240 transmitters if you multiply the reading by .57. I put 10 watts into my Bird Termaline Dummyload/wattmeter using a 25 watt 1.1 to 1.7 gHz slug (25K). Then I swapped the 25K slug with a 25E slug and read about 17.5 watts. I used a 1200 mHz bandpass filter to make sure that all the energy measured was on freq for accuracy...so if you have a 25 watt 400 to 10000 mHz slug you don't have to go out and buy another one for 1200 (unless you go over 14 watts...don't know if this fudge factor would apply to other slugs such as the 100 w).

MVD 1200 MHZ DUAL 901 PREAMP BOARD: Larry K6MOZ brought over his dual 901 board and WB6PBUs single 901 board for test. We found that both gave the same 2 db improvement in sensitivity. The extra gain of the second stage only increases the strong signal and IM problems. Both boards had to be rebiased for lowest noise figure. The 901s have a wide range of DC Beta and have to be readjusted by selecting the base bias resistor in series with the zener to give 5 ma of collector current. 5 ma is the magic collector current for lowest noise. The measured gains were 13 and 22. The lowest noise was with the first trimmer cap removed as was found at the VHF conference. A NE64535 in the first stage did improve the sensitivity another 1 or 2 db but the matching circuits were not right, and there was some instability. The matching sections are low Q so there is little rejection of out of band strong signals. So you may have to add a bandpass filter to keep out 2 meters and 434 video. Actually, a single stage is just as good and easier to house.

FREQUENCY COORDINATION:

SCRRBA MEETING: I presented a new 1200 mHz band plan to the technical committee that would give us 5 channels beginning at 1241 mHz spaced 12 mHz (same as broadcast) yet left almost 20 mHz for FM mode, and 2 mHz for weak signal, and 4 mHz for satellite. It was rell received, and a meeting with other mode users will be held sometime during the first quarter of 1981. The basic 12 mHz segment is outlined below. The video carrier freqs are: 1241 simplex and duplex with 434 or 426.25, 1253, 1265, 1277 for repeater outputs, and 1289 for links.



We expect to lose 1215 to 1240 in about 3 years so that end is being left open. 12 mHz spacing will keep the LSB interference well down. The actual freq assignments are flexible, but the lower freqs are the easiest ones to filter the 3rd harmonic for duplex or repeater operation. Much consideration was given to 1277 instead of 1241, but 1241 will remain simplex as the original idea for this freq was to allow full duplex operation with 434, and there are and have been more people there. However, 1277 will not be assigned until the others are filled. Mike has asked for 1253 if the new band plan is approved, but will operate on 1241 until that time. AMSAT has said that they are building a satellite with a 1260 freq. I'm trying to get them to fill the 1260-1270 segment from the bottom up rather than arbitrarily plopping down in the middle. It does mean that I'll have to go to a separate sound xmtr to eliminate the LSB sound subcarrier. One point I'm making to them is to leave 1265 for a future ATV satellite input. SCRRBA did ask how many were using the 426.25 freq as there were no reported interference reports. By the way, we appreciate those who used 426.25 during the week we used 434 continuously for Voyager.

AMSAT hopes to try again to put up a 435 input bird sometime in 1982 but is having a hard time getting definite space on a vehicle.

ARRL says that Ham Radio is not now looked upon as being a hobby that comes up with technical innovations, and therefore diminishes our strength at keeping our frequencies. However, public service activity does count a lot! So we can help by participating in more events and making sure they get publicized...Rose Parade, Congressional Cup Yacht Race, Operation Santa Claus, natural disasters, marathon runs, etc...get involved. HIRAN is trying again to get into our 420 to 450 band. They are in Alaska and the southern gulf. The signal is a transponder used to locate oil derricks accurately. The League is fighting it. The interference we have been experiencing lately is radar jamming by our own Navy for experimenting with countermeasures. But the signal signature varies. Let me know time and bearing of your observations.

Aviation charts are very handy to check bearing and distance to stations you work and to see how high obstacles are. Los Angeles Sectional charts are available for about $2 each at most all airports that have aircraft rentals and instruction.

AUTOPATCH

The .13/.73 autopatch is still being worked on by John Varga at his home. We still need some of those rare Prog Line tubes. Please check with John Varga if you have good 12AU7, 12AT7, 6BH6, 6AR5, 6AL5, 12AQ5, 6146, 6360, 6AQ5, 6CL6, or 6U8.

A couple of proposals for the eventual location of the machine have been made by WAØNHD and NØAWZ, among others. The executive board has been discussing the suggestions and will make a proposal at a future meeting.

PRODUCT ANNOUNCEMENT

Convert any Radio Shack color computer to an Amateur Radio SSTV keyboard. This program runs on a standard (unmodified) 4K color computer. The program is loaded from a cassette by the basic "CLOADM" command. A small interface must be constructed from a single (XR-2206) and a few discreet components, which are available by mail order.

Program features include memory storage of ten different SSTV pictures at a time, transmission of each picture ten times in any order, a picture format similar to that published in "73 Magazine" June, 1977 with an additional gray level bar at the bottom of the picture, characters and background that can be reversed by keyboard entry, and an eight gray level pattern that can be generated for alignment and test purposes.

The program costs $20, including the cassette and documentation.

Future software for development during 1981 includes an RTTY program featuring split screening, 60WPM reception and transmission, a 110 BAUD ASCII, and the use of your existing T.V. with no TRS80C modifications, along with SSTV picture reception that will allow 16K color computers to display SSTV pictures without TRS80C modifications.

For further information, write Clayton Abrams (K6AEP), 1758 Comstock Lane, San Jose, Calif., 95124.

MONTREAL REPEATER

An ATV FSTV Repeater is now operating from downtown Montreal. The repeater is approximately a year old and transmits in black and white, although there have been experiments with color.

The repeater has an input of 436 and an output of 446. It uses horizontal polarization and has an audio talkback in 2m. It is on the air from 1 PM to 1 AM daily.

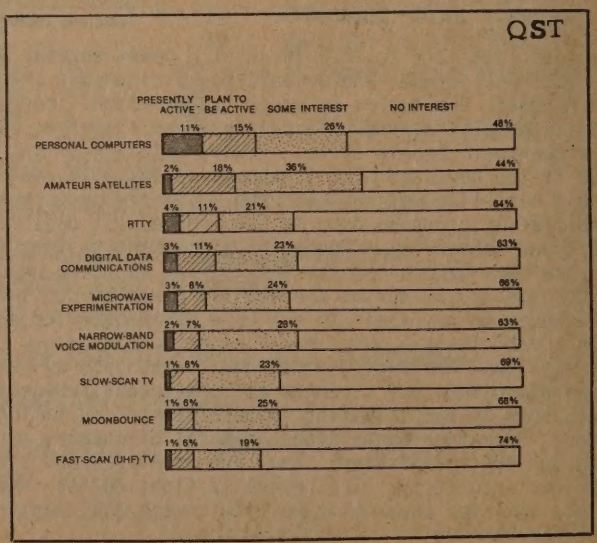
For further information contact Bruce Balla (VEZØO), Box 392, Montreal Int'l Airport AMF (Dorval) PQ Canada H4Y 1B1.

NEW DX SSTV QRP RECORD

There is a new distance DX record of QRP Mobile 5 watts (converted CB P16 Midland 13-893 SSB) on a specialized mode (SSTV-A5) as WBØQCD Mike Stone Lowden, Iowa successfully worked a two-way video-audio contact with Z56BQT Ernie Hagenaar of Johannesburg, S. Africa, miles from Lost Nation, Iowa near (Maquoketa) (S.E.) at 1:45 PM, CDT, on 28.682 MHz on 12-21-80. The event was witnessed by K6QWT Rob, Pen Valley, CA.

EASTERN IOWA ATV SOCIETY BULLETIN

First "live" transmission known in eastern Iowa on ATV was made in June 1980 by Jim, WBØZPX in Cedar Rapids to "kick" off a pioneering effort in Amateur Radio later to be joined by other eastern Iowa ATV'ers; WBØQCD, WBØKFB, W9RI, WDØEKP, KAØU and of recent WBØZPY. WDØAYT Dick in Clinton has moved to Montana, WB9MCF Ron in Burnside, Illinois (Keokuk) now has a working station as he bought out WDØAYT's equipment and has some interest going in the Burlington/Ft. Madison/Keokuk areas with tests successfully conducted for one way FSTV with WD9DJJ. Interested newcomers are WBØARW-Bill and WBØMEW-Bud in Muscatine, VE2FBO-Peter from West Liberty and several in the Cedar Rapids area. Cedar Rapids ATV'ers lead the progress with daily on-the-air exchanges at 439.25 Mhz. W9RI and WBØQCD exchanged carriers in August but as yet have not seen any actual video.



Answers to, "How interested are you in the following areas of Amateur Radio activity?"

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STATIONS NOW ON-THE-AIR

WBØZPX-PC Electronics system/RCA TCX-1000 camera/27 element KLM yagi at 50 feet/vestigal SB filter/working on lead-in cable and linear, WBØKFB-PC system/homebrew FMA5 subcarrier and transceiver built in kit form/RCA cameras/ homebrew handbook Colinear array at 45 feet/avid SSTV nut, WBØQCD-PC kit assembled in "F" style Dosy box with matching power supply/ 2nd downconverter unit built for monitor testing and mobile work/RCA-007 camera with 4-1 Zoom/"J" Beam 96 ele. at 60 feet/hardline but having trouble with SWR/German 422 SSTV system, KAØU and WDØEKP both homebrew all the way with updated report next issue.

Enclosed is a copy of the SCAL ARV Club Newsletter and what the "big boys (and girls)" are up to.

It is hoped that after this winter of "fine tuning" the ATV simplex systems, further serious thought and financing can begin on a combined group FSTV ATV repeater to be operable by all involved. Enclosed are early plans for such a system. Further discussion to follow at the January meeting of EIAS.

Davenport WOC-6 NBC Television picked up on WBØQCD's Saturn relay pictures from W6VIO last November and sent a film crew out to Lowden to film the historical event. About 20 outsiders dropped in the "open house" situation mostly students from area colleges interested in Astronomy. Several minutes of "air-time" were presented during the Nov. 16th 10 PM broadcast of News for the Quad City area. Nest Voyager 2 pass scheduled late August 1981 and we will be there!

CALLING ALL HAMS

Ask anybody now on-the-air, it is a long and frustrating effort to "getit all going" and some have quit before hardly even trying. Perhaps it's this challenge along with the pioneering curiosity and spirit that drives some to continue to obtain the goal that is beyond the reach of most. Join our funfilled venture into Amateur Radio's most complex mode of specialized communication-ATV. See you on 439.25 MHz and 146.43 MHz.

AAA5 CLUB NEWS AND VIEWS

PICTURE THAT!

Well we made it to #2. We lost a member and picked up a new one-W7IUA. Roland learned the difference between -3Volts and -2Volts video. Both the video board and the TV are all repaird now and working better than ever. The TV was one of the two non-working sets donated by WA7UJH (Bill). Roland interchanged 2-12 pin tubes and the TV started working. (Thanks Bill).

Roland gave an O-T-A (on-the-air) demonstration to a new potential member, Tom K2GQJ. Tom was so excited that he said "this is gonna cost me a lot of money!" Tom first saw HAM TV in 1952 and hasn't seen any since.

For those that don't know, we are still planning to inpur the repeater on 1253 MHz (Uplink) and output on both 434 MHz and 2380 MHz (Downlink). The 434 Mhz Downlink is 100% operational and we may be loaned the use of an FM 2300 MHz Xmitr by an interested non-member. If it can be set up for AM TV, it will be.

Several people have asked why input on 1200 MHz and not 450 MHz like Southern California. The original plan was in on 1200 MHz and out on 2300MHz. Both to get away from potential interference on the UHF band and to establish a viable presence on those bands (Grandfathering if you will). Itwas later decided to add the 434 MHz since we were already established there on simplex and for the ease of interested onlookers to tune in. The other modes of operation are well "entrnched" in the 70 cm Band and for a new club (us) to start putting 8 to 10 70cm wideband transmitters on the air there was too much potential for interference. (The ATV'ers in SoCal have had 15 years of "co-existance"!). =Nuff of that.

New Business: We have established a committee to meet with the A.R.A. to see if an agreement can be worked out to put our TV repeater at White Tanks. This location will give us excellent coverage and since Roland helps maintain W7EX/R (2 meter) anyway, he could combine trips to the mountain.

You will find included in the newsletter a copy of the proposed constitution. I would like to suggest some additional thoughts that represented the minority view at the committee meeting.

1. It is suggested that the words "with emphasis on Fast Scan" be added at the end of the statement of purpose.

2. In the section dealing with Regular Voting Memberships it is suggested that voting status be limited to those licensees who are allowed by the FCC to operate A5.

State of the art

by K.V.G.

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XF9-D	5.0 kHz	AM	$63.80	*Inquiries*
XF9-E	12.0 kHz	NBFM	$63.80	*Invited*
XF9-M	0.5 kHz	CW (4 pole)	$44.65	
XF9-NB	0.5 kHz	CW (8 pole)	$79.10	

9.0 MHz CRYSTALS

XF900	9000.0 kHz	Carrier	$5.15	*Shipping*
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XF902	9001.5 kHz	LSB	$5.15	*$1.75*
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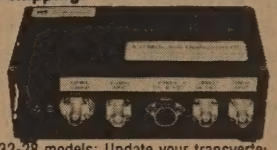
TRANSVERTERS FOR ATV OSCARS 7, 8 & PHASE 3

Transverters by Microwave Modules and other manufacturers can convert your existing Low Band rig to operate on the VHF & UHF bands. Models also available for 2M to 70cm and for ATV operators from Ch2/Ch3 to 70cms. Each transverter contains both a Tx up-converter and a Rx down-converter. Write for details of the largest selection available.

Prices start at $189.95 plus $3.50 shipping.

SPECIFICATIONS:

Output Power	10 W
Receiver N.F.	3 dB typ.
Receiver Gain	30 dB typ.
Prime Power	12V DC



Attention owners of the original MMt432-28 models: Update your transverter to operate OSCAR 8 & PHASE 3 by adding the 434 to 436 MHz range. Mod kit including full instructions $23.00 plus $1.50 shipping, etc.

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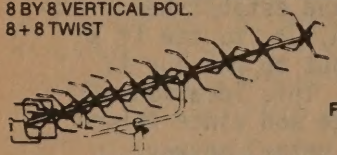
8 + 8 TWIST — 8XY/2M



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Amateur Television Magazine

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— REMARKS —

BELATED APOLOGY.....
A mistake was made in the MAR/APR 81 issue on page 24 which needs to be corrected. The comments under the photos were made by ZS6BTD Gerald Klatzko not ZS6BQT Ernie Hagenaar. The photos were indeed taken from the QTH of ZS6BQT in Johannesburg, S. Africa. Sorry fellas! WBØQCD

Send in your listings of gear wanted, for sale or trade to A5 Classified section. Free ads to our valued subscribers!

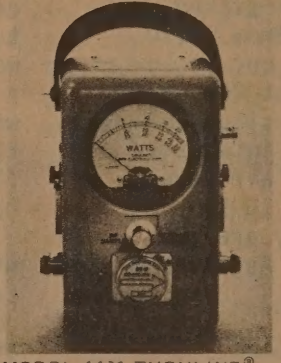
Is it really true that WB1ARZ sends "nasty" pictures via 2-memory motion-SSTV?

Did WA4OAA get so lost in FSTV that he misplaced his SSTV gear?

Does WB9UCW really have 8 monitors going?

THIS IS IT

BIRD



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All About Amateur Television

Or how I learned to see myself as others see me!

By Henry B. Ruh,* KB9FO (Reprinted with permission QST Magazine June 1981 issue)

(Photo courtesy Science Workshop)

There has been an explosive increase in amateur television (ATV) activity in the past few years. Many hams who were involved in ATV years ago and a number of newcomers are discovering that ATV is inexpensive, fun and educational, allows for a more vivid expression of self, and provides a vital public service. ATV has come of age.

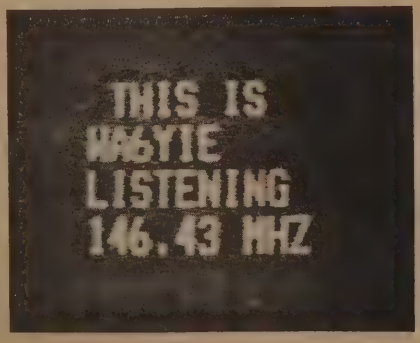
ATV is identical to the type of TV you are accustomed to watching in your living room. The technical standards are basically the same. Video is transmitted by amplitude modulation. The audio is transmitted in any one of a number of ways: on a 4.5 MHz subcarrier (as with commercial TV), by frequency modulating the video carrier (called on-carrier sound), or by using another amateur frequency (such as 2 meters) for separate sound transmission.

Fun With Repeaters

There are ATV repeaters similar in operation to the more familiar 2-meter fm repeaters. Three different types of ATV repeaters exist. Some (such as WR4AAG, Washington, DC), operate in-band. These receive a TV signal in the 450-MHz band and repeat the signal in the same band.

*7391 W. State Highway 46, Ellettsville, IN 47429

An example of the display presented by a computer-operated ATV repeater. The picture conveys time, signal report and test pattern information. *(Photo courtesy W6ORG/RPT)*



Self-explanatory — an ATV CQ!

The obvious advantage is that you need only *one* antenna for transmission and reception. As your station becomes more sophisticated, or if you live close to the repeater, you can also monitor your own transmitted signal (full duplex). Most operations are half duplex — you take turns transmitting and receiving.

Some ATV repeaters operate crossband; you transmit to the repeater in the 450-MHz band and receive the repeater signal in the 1240-MHz band. This requires the use of two antennas and two transmission lines, but it allows you to become interactive with the repeater; you "talk" to the repeater and it "talks" back to you. Many of these repeaters are connected to computers, which you access with an ASCII keyboard while transmitting afsk. The repeater/computer digests your input and sends something back to you which is displayed on a video screen: games, signal reports, computer-remembered messages, the output of your own computer program, weather maps, weather radar pictures or videotaped replays of previous transmissions. Not only can you interact with the repeater, but your friends can join in the fun since everyone can watch and take turns transmitting to the repeater. A sophisticated system can accommodate more than one "player" by using dif-

ferent inputs and a common output. Play chess or bridge with the computer or your friends. Transmit computer to computer and watch the results on the screen. Your imagination is the key.

A third type of repeater system would incorporate different inputs/outputs or special TV modes such as narrow-band TV. This system is used in Europe where the signal bandwidth is more restricted than in the U.S. The usual technique is to restrict the video baseband to 1 or 0.5 MHz. Australian amateur systems have one freedom not permitted in the U.S.: They can have an output in the 35 cm band which is in the middle of the uhf TV band. This allows the public to watch as well! Of course, you could provide a receiver and modulator and put your signals on you local cable TV system.

ATV Past

In the early days (before 1960), it was common practice to use a commercially available uhf TV tuner or converter modified to operate on 420 to 450 MHz. These tuners proved to have a 14-dB or higher noise figure, and a severe lack of gain (sometimes no amplification at all), resulting in a 7- to 20-dB conversion loss. It's no wonder that uhf TV reception was then problematic! Such receivers would pick up a 500-watt TV signal 1 or 2 miles (1.6 or 3.2 km) distant, but anything beyond that was sheer luck. So if you tried the TV tuner approach earlier and lost interest because you couldn't see anything, that's the reason why! Modern receivers, converters and preamps have typical noise figures of 1.5 dB or better and often a gain of 20 dB or more. Today, there's no squinting through the "snow" even when viewing the output of a station using a 10-watt transmitter at a distance of 60 miles (100 km).

Before 1975, all ATV work was done with horizontally polarized antennas. Over the years, we have changed to vertical polarization. Why? Primarily because the *repeaters* are vertically polarized. DXers use horizontal polarization, but unless you live in the great midwest (anything between the east and west coast mountain ranges), you probably won't be DXing anyway. ATV repeaters use vertical polarization to achieve omnidirectionality. While commercial TV stations use antennas that have omnidirectional horizontal gain, ATVers haven't discovered the slot radiator, traveling wave or pylon type antennas and have resorted to using vertical gain antennas of the multi-dipole or Station Master types. This is probably because such antennas can be purchased off-the-shelf and the others would have to be built.

Getting Started

You can build your own equipment, or buy it, either in semi-kit form or right off-the-shelf for plug-and-play (appliance) operation. A typical ATV station can be put together for about half the price of an hf transceiver or the price of a 2-meter fm rig — about $250 to $350. If you're an "appliance" operator, you will spend more to get the same results as the ham who is able and willing to build or scrounge some of the equipment. A lot of ATVers got on the air for less than $50 by using cast off equipment and gear bartered for at hamfests. You already own the most essential item, a TV set. Other equipment you'll need includes the receiver and transmitter, a TV camera, some low-loss coaxial transmission line and an antenna. A list of suppliers and the equipment they offer is shown in Table 1. You are encouraged to write for their catalogs.

Receiving: A complete ATV receiving station may be yours by merely connecting the output of a 439-MHz converter to your TV set and an antenna to the converter input. Converters range in price from $10 for the simple Varactor tuner type to approximately $80 for the more deluxe units which include low-noise rf amplifier stages and doubly balanced mixers.

Transmitting: Modern ATV transmitters have provisions for both on-carrier and subcarrier audio. The on-carrier audio capability is needed if you're going to be using an ATV repeater. Most of the ATV repeaters use a separate receiver to recover the frequency-modulated on-carrier audio signal. This is because most ATVers started with a 450-MHz fm rig and added video provisions to it. Today, you can purchase units that fit in the palm of your hand and are powered from a 12-V dc source capable of supplying a few amperes of current. (The power supply should be no problem since you probably have one in your shack already. If not, a simple supply may be built or purchased.) Low-power transmitters cost about $80 and a power amplifier approximately the same; even complete transceivers are available.

Video Sources: The required video input for the transmitter can be obtained from a TV camera or other video source such as a video tape machine. Camera requirements are minimal. It should deliver a 1-V composite video signal, have either interlaced or random scanning, and horizontal and vertical sync pulses which need not conform exactly to any technical standard. A closed-circuit TV (CCTV), surplus commercial, home video, or home-built camera may be used. Prices can range from as little as $10 for a camera purchased at a hamfest to as much as $850 for a first-class color camera. A means of supporting the camera will be needed. Most cameras can be fitted to a standard photographic tripod or, in a pinch, be suspended from the ceiling with a length of wire.

If you own or have access to a video tape recorder (VTR) or a slow-scan TV (SSTV) setup, you can use that as a video source as well. With the VTR, you can make your own programs and record what you're receiving off the air. This is especially nice when friends ask you what you do with your ATV gear — show them the tape!

Your Studio

Probably the most often overlooked

Table 1
ATV Equipment Suppliers

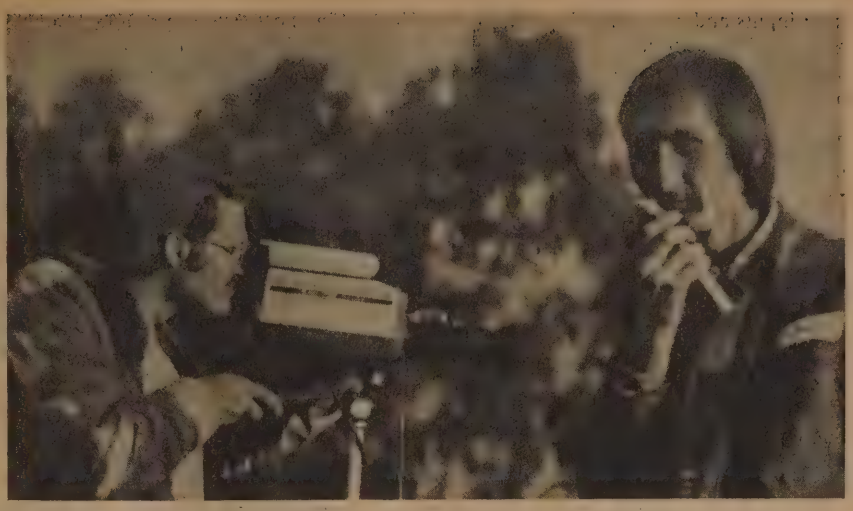
Suppliers	*Equipment*
P.C. Electronics 2522 Paxson Arcadia, CA 91006	Transmitters, receivers, antennas, converters, cameras, semi-kits, ATV repeaters, amplifiers, accessories
Aptron Labs 3623 Grandview Dr. Bloomington, IN 47401	Transmitters, receivers, antennas, converters, ATV repeaters, accessories (for 450 MHz only)
Science Workshop P. O. Box 393 J Bethpage, NY 11714	Transceivers, converters, accessories
Denson Electronics P. O. Box 85 Rockville, CT 06066	Cameras, monitors, surplus TV equipment
Spectronics, Inc. 1009 Garfield Oak Park, IL 60304	Antennas, some surplus equipment
Applied TV Research (ATV Research) 13th and Broadway Dakota City, NE 68731	Cameras, monitors, accessories, kits

item in any ATV station is lighting. While our eyes do not easily recognize shadows and areas of relative darkness, the camera will tend to emphasize these differences and produce pictures that look different on the TV screen than they appear to our eyes. Areas of interest must be lighted evenly. The best way to do this is to use three lights: a general flood light to the left and right of the camera position, directed toward the area of interest, and a back light, shining from above and behind the subject. The back light helps to eliminate shadows and separates the subject from the background. A photographic light bar may be attached to the camera mount to allow the light source to follow camera movement.

The amount of light required will depend on the camera being used. Older cameras need anywhere from 600 to 1000 watts to light a given area, newer monochrome and early color cameras 300 to 600 watts, and the newest cameras 100 to 300 watts. The newer cameras also have much better automatic light compensation and are not blinded by "hot spots" (highlights or bright back-lighting). Cameras, lenses and studio lighting are covered in detail in the listed publications.[1,2,3]

You will undoubtedly want to show photos, slides and drawings to your "audience." An easel placed in a convenient area may be used to do this. A roll of RTTY paper placed behind a panel with a slot at the top through which to pull the paper becomes a quick and easy way to write messages. You can even use paper towels and crayons!

Antennas and Transmission Lines: You *must* use a good antenna and transmission line if you expect decent results at uhf. At these frequencies and in lengths exceeding 20 feet (6 m), you might regard RG-8/U as a dummy load. A *short* length of RG-8/U or other cable of good quality is okay for use as a "pigtail" up near the rotator, but that's about it. If you're contemplating the use of CATV cable, be careful. CATV trunk cable is checked only to 300 MHz. Even the Superbrand cable is swept only to 400 MHz. Also, CATV cable connectors are expensive and hard to get. Homemade connectors on CATV coax are generally poor at these frequencies. Heliax cable at a cost of approximately $1 per foot (0.3 m), less at hamfests, is to be desired. Since you'll buy the cable only once, you might consider using cable such as 1/2 inch (12.5 mm) Andrew Heliax. The best compromise between price and performance at 450 MHz is 7/8 in. (22 mm) air dielectric Andrew Heliax. It costs about $2 per foot (0.3 m). Purchase a sufficient length to allow for gradual bends; sharp bends in this type of transmission line must be avoided. The transmission line should be fastened to the tower to prevent wind flap and provide mechanical support.



Ernie Williams, WB6BAP, operates the ATV camera for the Rose Parade coverage while an unidentified friend relays information.

Brass-type UHF or N connectors should be used to ensure low loss and long life. Avoid using adapters as they introduce loss; every decibel at these frequencies makes quite a bit of difference in signal strength. The connectors should be attached securely to the transmission line and each connection weatherproofed using PVC tape or other methods.

A uhf antenna offering a gain of 15 dB or more should be used. The Cushcraft DX-420 is about the least expensive commercial unit available and it works well. The J-Beam model MBM-48, offers superb performance in a small package. It is a skeletal slot array that has about 5.5 dB of gain. KLM's 420-450-27 is a multiple-driven-element Yagi design with 27 elements. All three antennas have proved themselves in actual use. If you can afford to purchase more than one antenna, stack as many of them as you can. Don't worry about size. At uhf, you can mount a 200-element array in the space required by a 10-meter monobander with room to spare. You can even tell your neighbors that it's a new TV antenna. (Well, it is!)

Perhaps you would like to build your own antenna using one of the number of different designs that have appeared in various amateur publications over the years. Once a particular design is chosen, do not deviate from the given dimensions; measure them accurately. A 1/2-inch (13 mm) error at 450 MHz has more of an effect on antenna performance than it does at 20 meters! Measure twice, cut once, and you should be set.

Remember that treetops are your electrical ground at 450 MHz. "Earth" may be up 50 feet (15 m) or higher if you live in a wooded area. You must get the signal above the treetops if you expect a working range of more than a few miles. If this principle is put into practice, you'll find that your 450-MHz working range is nearly what you would expect on 2 meters.

On The Air

At this point, you can get on the air and have fun. What can you expect from your low-power unit? Well, the known record for a 1/4-watt ATV signal is a distance of 215 miles (346 km). Granted, this is unusual, but a 10-watt transmitter is reliable for communicating over distances of 20 to 30 miles (32 to 48 km), and often as much as 60 miles (100 km), depending on surrounding terrain and the antenna system used.

While on the subject of power, remember that the video is amplitude modulated except that it is *negative* modulation. During a-m phone operation, the carrier level increases when you modulate. With ATV video, the carrier level *decreases* with modulation. This is done to reduce the effects of noise on the stability and viewability of the picture. Since the modulation is subtracting from the carrier level, the output power (as indicated on a wattmeter) will indicate a lower level of power during modulation than with an unmodulated carrier.

If you desire a more technical explanation of the makeup of a TV signal, excellent texts are available.[4-8] *A5 Amateur Television Magazine*[9] is a bi-monthly compendium of all ATV activity and provides a continuing source of information.

Building Up

A couple of additional items will help "sharpen up" your ATV station operation. One of the more valuable aids is an rf monitor/demodulator. A TV set/converter combination will not permit accurate off-the-air monitoring because it will overload. The inexpensive (about $25) rf monitor/demodulator allows you to

Notes appear on page 7

demodulate your transmitted signal and view it on an oscilloscope or video monitor. It is the only way you have of seeing what your signal really looks like without going to a friend's house a mile away and viewing it in his shack.

The second item is a video monitor. With it, you can observe video information *before* it is fed to the transmitter so that you can align your shots, watch VTR playback and so on. A simple selector switch will allow it to be used for all video sources. New monitors cost about $150 and are well worth it.

Outdoors with ATV

Sooner or later, you'll want to explore the great outdoors. There's no reason why your ATV station can't follow you. ATV has been used from Field Day sites, mountaintops, airplanes, hot-air balloons, ships, rooftops, cars, trucks, vans and motel rooms.

There have been numerous fly-bys at hamfests by TV-equipped planes. I was pleased to work with Tom, W6ORG, for the first airplane-to-airplane TV QSO while we both flew over Lake Mead near Las Vegas, Nevada. ATV has been used to transmit parades for shut-ins and allowed Santa to visit children in hospitals. It was responsible for the closing of a car theft and "chop shop" ring when an ATV fly-by revealed several stolen cars and travel trailers to interested police who happened to be viewing the ATV demonstration. During the Tournament of Roses Parade in Pasadena, ATV televised the traffic flow for the Los Angeles Police Department. ATV can create a real public image for Amateur Radio. The possibilities are endless! If nothing else, set up a camera and CCTV monitor and let the folks look at themselves looking at themselves!

I hope the information presented here has provided you with some ideas and will perk your interest in ATV. The next "BCNU" you transmit could mean just that!

Notes

[1]Ruh, "Amateur Television in a Nutshell, Vol. 2," Available from *ATV Magazine*, 7391 W. Highway 46, Ellettsville, IN 47429, $9.95 postpaid (available October 1, 1981).
[2]Zettl, "Television Production Handbook," third edition, Wadsworth Publishing Co., Belmont, California.
[3]*Teaching Health Professionals Interpersonal Skills: Using Television*, Vol. 5. Available from National Medical Radio Visual Center, Center for Communicable Disease Control, Atlanta, Georgia.
[4]Ernst, "Fernsehfernempand als Hobby." Available from W. Keller and Co., Stuttgart, West Germany.
[5]See note 1.
[6]See note 2.
[7]*Amateur TV Handbook*, RSGB. Available from Ham Radio Bookstore, Main St., Greenville, NH 03048.
[8]Presti, *ATV Handbook*. Available from Aptron Publications, P. O. Box 323, Bloomington, IN 47402, or Ham Radio Bookstore, Main St., Greenville, NH 03048.
[9]*ATV Magazine*.
Subscription rates for this bi-monthly publication are $7.50 in the U.S. and $10 outside the U.S.

ARR is proud to offer the complete Microwave Associates Gunnplexer and accessory line. Two of the Gunnplexer transceivers shown here (the MA87141-1, at only $239.95 per pair) can form the heart of a 10 GHz communications system for voice, cw, video or data transmission, not to mention mountaintop DXing! ARR sells a line of necessary support equipment such as power supply/modulator and receiver boards. Write or call for additional information.

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☐ KIDSWORLD, a nationally syndicated children's television show will air a segment on Amateur Radio entitled, "American Radio Relay League." To find out when the program will be aired in your area, call your local television station carrying the series and ask about the "American Radio Relay League" segment, episode number 175. A videotape cassette of this program can be purchased for $44 from Video Tape Associates, Inc., 2351 S.W. 34th St., Fort Lauderdale, FL 33312. Refer to the title and episode number when ordering.

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- Really aids public service communications for parades, RACES, CAP searches, weather watch, marathons, etc.
- DX is about the same as 2 meter simplex - 15 to 100 miles.
- ATV uses broadcast standards. No special converters needed. Receive full color and sound on a regular TV set.

TC-1 TRANSMITTER/CONVERTER ALL IN ONE BOX READY TO OPERATE **$399 delivered U.S.**

Plug in any closed circuit camera, antenna, mic., and TV set and you are on the air. Contains the basic four modules, AC supply, and T/R switch. Full color and sound. Specify xmtr freq and TV ch 2 or 3.

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GP-4D COLOR CAMERA ..... **$ 839 ppd**

Special: NE64535 "Free"

Build Your Own System with The Basic Four Modules

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This wired and tested module is designed to drive the Motorola MHW-710 module in the PA5 10 watt linear amp. The crystal in the 100 mHz region keeps harmonics out of two meters for talk back. The video modulator is full 8 mHz for computer graphics and color. Requires 13.8 vdc reg @ 70 ma. Tuned with xtal on 439.25, 434.0 , or 426.25 mHz. Two Freq $ 115 ppd.

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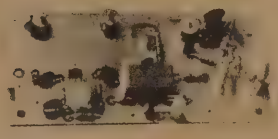
The PA5 will put out 10 watts RMS power on the sync tips when driven with 80 mw by the TXA5 exciter. 50 ohms in and out, plus bandwidth for the whole band with good linearity for color and sound. Requires 13.8 vdc regulated @ 3 amps.

3. FMA5 AUDIO SUBCARRIER GENERATOR ..... **$ 29 ppd**

Puts audio on with your camera video just as broadcast TV does at 4.5 mHz. Puts out up to 1 v p-p to drive the TXA5 or VM-2, 3, or 4 modulators. Requires low Z mic (150 to 600 ohms), and +12 to 18 vdc @ 25 ma. Works with any xmtr with 5 mHz video bandwidth.



4. TVC-2 ATV DOWNCONVERTER ..... **$ 55 ppd**

Very sensitive stripline MRF901 (1.7 db NF) preamp and double balanced mixer module digs out the weak ones but resists intermods and overload. Connects between uhf antenna and TV set tuned to channel 2 or 3. Tunes 420 to 450 mHz. Requires +12 to18 vdc @ 20 ma. Super sensitive TVC-2L with NE64535 preamp (.9 db NF) preamp $ 79 ppd. Limited Offer; NE64535 $69.00!

TVC-4 ATV DOWNCONVERTER ..... **$ 89 ppd**

This is a packaged version of the TVC-2 converter with internal power supply. Has BNC input and F output connectors. Also available with the NE64535 for $115 ppd. Size 5¼ x 2½ x 7 inches. Special Offer; $105.00 ppd. !

PACKAGE SPECIALS

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BASIC MODULE PACKAGE .... $ 239 ppd

OPTIONS:

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NE64535 low noise downconverter . add $ 30
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2522 PAXSON
ARCADIA, CA 91006

Maryann WB6YSS — Tom W6ORG

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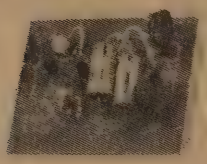
TVC-12 1200 MHZ ATV DOWNCONVERTER . . . . . $79.00 ppd

Tunes 1215 to 1300 mHz from the shack. Can be mounted at the antenna to save line loss. Outputs on channel 7 or 8. High rejection to 439 mHz on 1241 and 1265 when used with the 1296-LY loop yagi for full duplex ATV or crossband repeater. Requires 12 vdc reg @ 20 ma and 10K pot.

VIDEO MODULATORS



NEW

VM-2 TUBE TYPE XMTR MODULATOR . . . . . .$20 ppd

Grid modulates tetrodes:5894, 6907, 6524, and high power 4X250 and 8930s

VM-3 1WATT TRANSISTOR XMTR MODULATOR . . . . . $20 ppd

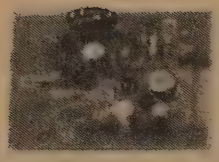
VHF ENG TX432B exciter, etc.

VM-4 2C39 CATHODE MODULATOR . . . . . .$25 ppd

High level modulate for full color and sound bandwidth on 400 and 1200 mHz.

All PC boards only $5

2N6424. . . . . .$5 2N3738 . . . . . .$5



DM-1 RF/VIDEO DETECTOR & MONITOR . . . . . $20 ppd

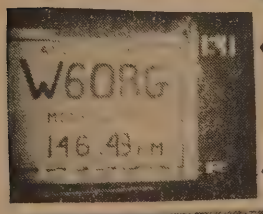
Connects to antenna coax to sample the xmtr RF. Receiving your own RF can be misleading on a TV due to overload and bounce. Directly drives a monitor with video and with a 50 uA meter gives relative power. Requires +12 to 18 vdc @ 25 ma. PC Board only . .$5.

TVG-1 ATV TEST GENERATOR . . . . . $15 ppd

Connect your camera and you have about one milliwatt on the air for demos or receiver alignment. Just a simple modulated oscillator tuneable from 420 to 450 mHz. Requires 9 VDC @ 7 ma.

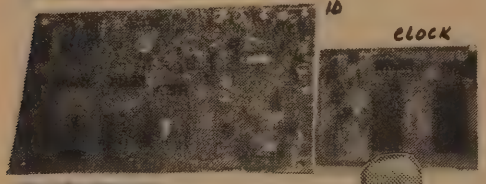
CCI-1 TRS-80 TO TV CAMERA INTERFACE. . . . . .$25 ppd

Superimpose your computer on the camera video for titling or special effects. Board mounts in computer, drives camera and separate monitor. Computer is master sync gen. to externally syncable camera. Hitachi HV-62SU ext sync camera . . . . $325 ppd.



VID-2 VIDEO CALL IDENTIFIER . . . . . $99 ppd

Superimposes your call or any combination of 6 letters over the camera video. A must for repeaters. Connects in line between camera and xmtr and has own internal sync separator and drive. Controls for position, in/out, black/white, and two camera video switcher. Requires 12 vdc @ 200 ma. Extra programmed ROM...$15.



VC-1 VIDEO CLOCK 6 digit 12/24 hr superimposed with VID-2 on the screen. 2 extra digits available for S meter, temp, etc... . . add $59.

VA-1 VIDEO BUFFER / INVERTER . . . . . $12 ppd

Isolates video line to drive other devices such as monitors xmtrs, VCRs, etc without loading. Make your own video distribution system or convert a TV to a monitor. Specify inverting br non inverting. Requires +12 to 18 VDC @ 25 ma.

TSQ-1 S-METER AND SQUELCH BOARD . . . . . $5 ppd

Tap into the TV video IF AGC line, break one speaker lead, connect into this board and you can align the antenna better and not have to listen to the noise between contacts. Uses common Radio Shack parts.

All prices are delivered in USA. All orders are check, money order, Master Charge, or Bankamericard. Allow 3 weeks after receipt of order for delivery. Charge card orders only by phone 5 to 6 PM your time: (213) 447-4565.

73, TOM W6ORG P.C. ELECTRONICS, 2522 PAXSON LANE, ARCADIA, CA 91006

IDS-1 ID PROM SEQUENCER BY W6ORG TOM O'HARA

The ID Prom sequencer module will step between 2 to 5 programmed prom memory chips over a adjustable time on period upon key up of a transmitter or other device. The sequence will automatically rekey at a selected later time period as a transmission time reminder or to meet legal station identification requirements. The sequence line can be opened to give a continual repeated sequence also. A 16 pin IC jumper ribbon cable connects between the IDS-1 board and the prom socket on the VID-3 board.

U1 is enabled when the voltage at connector pin 20 goes above 8 volts DC as is done if connected to the +13.8 vdc transmit power buss. The sequence oscillator is then turned on and supplies clock pulses to U3, a 12 stage binary divider. The 1 meg pot sets the oscillator frequency in the few hz per second range. This sets the actual time that one prom is on and is the osc. freq divided by 32. This divided frequency is applied to a 4017 decade divider which inturn sequences thru the proms until reset by the jumpers J1 and J2 connected to U2 and U4s reset input. If there are three proms then J1 connects to pad 3 of U4 and J2 goes to the following pad, number 4. J3 will restart the sequence on the fall of the square wave pulse out of the binary divider. Each pad around U3 divides the previous by 2. So pad 10 is pad 5 divided by 2 to the 5th power or 32. But since J3 is triggered on the fall of the wave it is one more division or 64. If this pad is selected and the incremental prom sequence rate is set for 4 seconds, then the rekey time will be a little over 4 minutes later. Pad 11 will give about 9 minutes then. At any time during the prom sequence, the hold line may be grounded and that particular prom will stay on. When the ground is lifted the normal sequence will continue. There are two open collector outputs available to turn off and on the display under this modules control. The VID IN/OUT on pin 4 goes low during sequencing and turns on the VID-3 output data on. In like manner but opposite polarity, the output on pin 13 goes open to enable the clock module VC-1.

CONNECTOR

1,A	GROUND. power and signal return
4	VID IN/OUT. open collector pulls to ground during sequence.
5,E	+5vdc reg. 5V power supply input
B	J1 JUMPER. external switch selects continuous (open) or one
C	" " sequence and shut off (jumper between B and C).
13	CLOCK IN/OUT. open collector goes open during sequencing.
15	PROM HOLD. stops and holds active prom when grounded.
20	+13.8 XMIT. greater than 8 volts starts sequence. ground resets.
22,Z	GROUND. power and signal return.

Make sure the card is plugged in correctly before applying power, the lettered connector pins are on the component side. Connector is a dual 22 pin edge connector such as Radio Shack RS-276-1551. The 16 pin ribbon cable jumper is a Radio Shack RS-276-1976 or equiv.

Additional programmed 256 bit (8x32) proms are available for $15 each. Specify the 6 alphanumerics or supply a matrix sketch as is found on the VID-3 module sheet.

P.C. Electronics, 2522 S. Paxson Ln., Arcadia CA. 91006

W6ORG (c) 2-81

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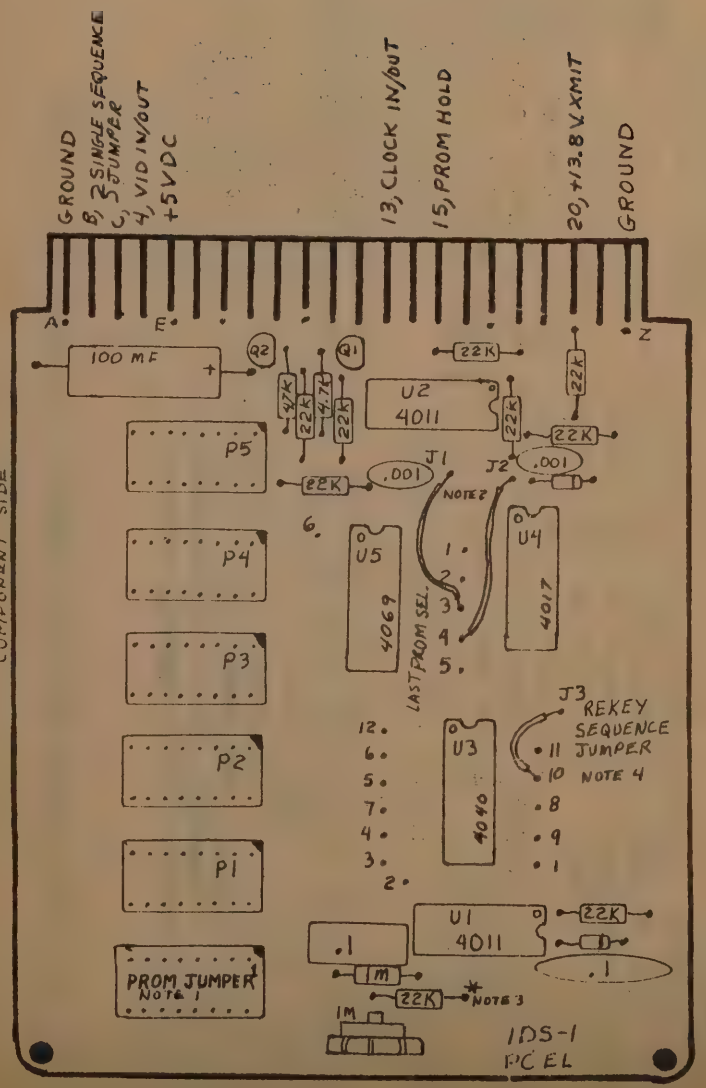
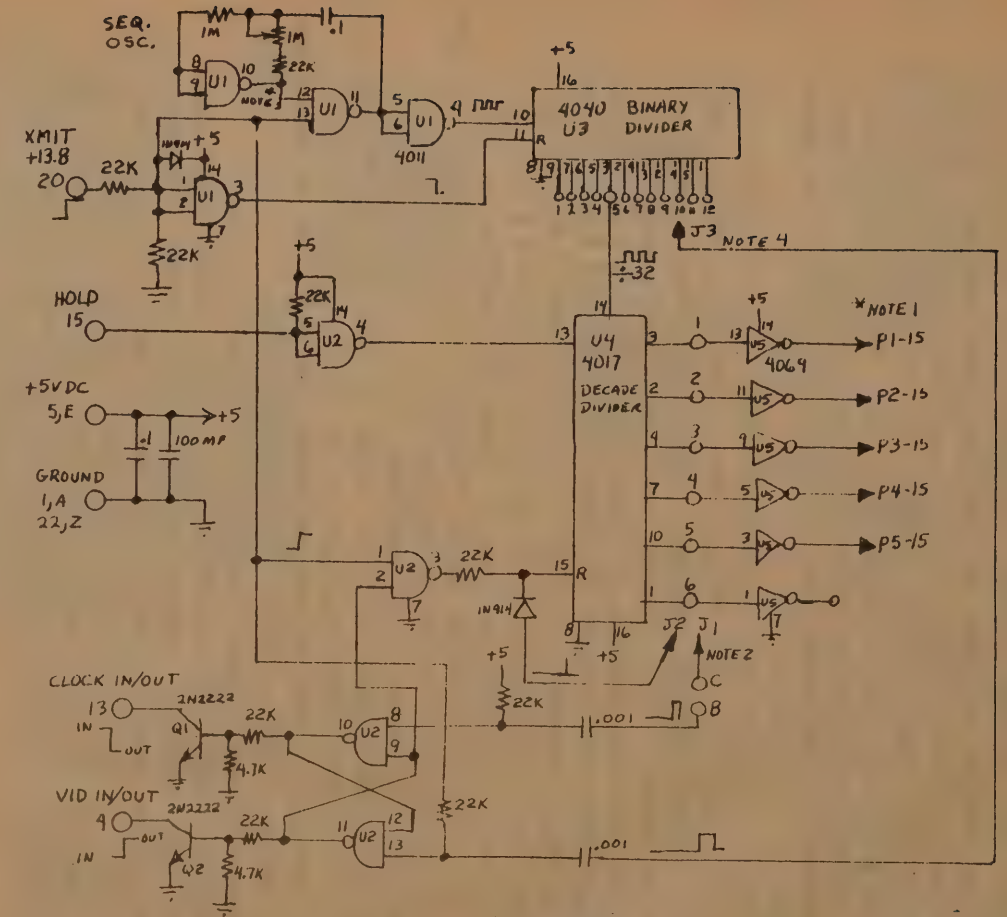
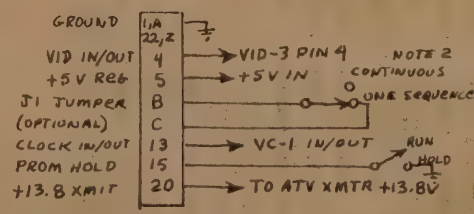






JUMPERS ARE SHOWN FOR 3 PROMS, ONE SEQUENCE UPON KEY UP, 4 SEC/PROM, AND REKEYED ABOUT 5 MINUTES.

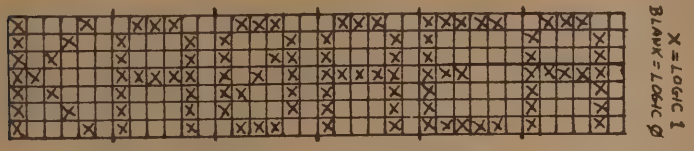
NOTES:

1. ALL PROM SOCKET PINS EXCEPT 15 ARE PARALLELED. USE 16 PIN JUMPER CABLE TO VID-3. PROM SOCKET.
2. JUMPER J1 CAN BE CONNECTED DIRECTLY TO THE LAST PROM NUMBER PAD OR WIRED THRU CONNECTOR PINS B AND C, TO ENABLE CONTINUOUS OR ONE SHOT SEQUENCING. J2 CONNECTS TO THE PAD NUMBER AFTER J1.
3. FOR ACCURATE TIMING A PERIOD COUNTER CAN CONNECT TO #22K RESISTOR. ADJUST 1M POT FOR DESIRED SEQUENCE TIME.
4. J3 SETS THE REKEY SEQUENCE TIME. EACH NUMBER AT U3 DIVIDES THE PREVIOUS BY 2.

PROM SEQUENCER. (c)2-81 W6ORG

VID—3 VIDEO IDENTIFIER

The VID-3 Video Identifier board will enable superimposing station call letters, or any group of 6 alphanumerics, or more depending on how well they fit in a 7 rows by 36 line dot matrix, upon the applied video. The alphanumerics are programmed in a SN74S188N 256 bit PROM. Each bit in PROM memory is clocked out serially on the ID Key Out at pin 10 thru an open collector buffer, U13. This key line pulls low the transmission gating circuitry on the VDM-3 board that does the actual superimposing. Horizontal and vertical drive negative going pulses from the VDM-3 board start and position the alphanumerics within the picture. The position is determined by the pots connected to the dual one shot, U1.



The dot clock, U3, is turned on and off by the position 1 shots keyed by the horizontal and vertical drives. Dot width is determined by the .001 mf mylar cap at U3 pins 2 and 6. This value can be varied some to widen or narrow the display. U4 divides the horizontal freq. by 2 which effectively makes the ID skip every other horizontal line and thereby makes the display a total of 14 horizontal scans high. If a smaller height is desired, U4 can be removed and a jumper put between U4 pins 11 and 9. The horizontal freq. divided by 2 is also brought out to card edge pin 11 to enable making other superimposed graphics larger and more readable... the clock module for instance. Half of U5 stops the dot clock when it recognizes 36 dots from dividers U6 and U6. The dot clock starts again after the set delay from the 2nd horiz. pulse. This will recur until all 7 lines are completed and the dot clock disabled by the other half of U5 recognizing 7 lines from divider U8. U11 serially outputs the data from the 8 Prom parallel outputs at the dot clock rate applied to divider U9. The Do of U9 and divider U10 change the Prom memory line output after each 8 dot clock bits until 32 lines later the end of 7 ID line gate stops the process and resets everything until the next vertical frame. U13 is an open collector buffer which pulls low during a valid ID dot. Up to 12 vdc through a 1K resistor may be applied at this output and many other open collector outputs from other modules in parallel.

CONNECTOR: Pins 5,E must have a regulated +5 VDC supply. A,1 Ground, power supply return. 4 ID IN/OUT. ID active if grounded, disabled if open. TTL levels. 11 Horiz. +2. TTL level 2 loads. Drives other effects modules. 17 HORIZONTAL DRIVE IN. Internal pullup to +5, pull to ground from VDM-3. 19 VERTICAL DRIVE IN. Internal pullup to +5, pull to ground from VDM-3. 20,X EXT VERT. POSITION. Optional external 50K pot control such as on a front panel. Remove on card pot if used. 21,Y EXT. HORIZ. POSITION. Optional external 25K pot control such as on a front panel. Remove on card pot if used. Z,22 GROUND. Signal returns.

Make sure card is plugged in correctly before applying power. Lettered pins are on the component side and numbered on the solder side. Connector is a dual 22 pin such as Radio Shack RS-276-1551.

For more than one prom, a jumper cable (RS-276-1976) can be plugged into the PROM socket and into the IDS-1 ID Sequencer module. The various proms will then be sequenced in the picture at a few second rate. If more than one at the same time is desired, another VID-3 board may be paralleled.

Additional programmed proms are available for $15 each. Specify up to 6 alphanumerics or supply matrix sketch as KAØAEA example above.

VDM-3 DISPLAY MIXER

The Video Display Mixer board contains: a two input switcher, inputs for keying in superimposed alphanumerics, a sync separator with phase locked horizontal and vertical oscillators, two each horizontal and vertical pulse outputs for driving special effects and ID boards or for giving a raster with superimposed ID on one of the selectable inputs, and at the user's option the parts can be stuffed in the board for up to 4 v p-p vertical and horizontal drive into 75 ohm lines to an externally syncable camera for special effects.

U1 is a transmission gate which is used to select either of the two video inputs. The input is selected by an open on the active input and the other select line grounded. One of the select lines must be grounded. When the Key Input is pulled to ground with data pulses, the video input is switched out and a DC level set by an external pot (typ 3v) and/or 3.58 mHz for color is switched in.

The sync separator and the drive outputs can be keyed from either the video on input 1 or by whichever input is selected by means of a solder jumper. The board is sent with jumper "1" which provides syncing of all external boards to the video input on input 1. This allows use of the raster when switched to video input 2 or for an externally syncable camera. Jumper 1 can be removed and 2 jumpered if two separate nonlocked cameras are used.

The free running frequency of the phase locked loops are set to 60 and 15734 Hz by the 10K multiturn pots. They will provide

drive output even if camera video is lost. Locking range is about 5% of the free running frequency. U3 sets the drive pulse width and is set for 6.3 us on the horizontal and .67 ms vertical. Solder jumpers are set for the phase lock oscillators (4 and 6) but direct inputs (3 and 5 see schematic).

U4 is a hex open collector buffer for the drive outputs. 2 each 5K pots, 470, 22, and 1K resistors, and 2N2219 transistors can be added if an externally syncable camera is to be used. The 5K pots set the drive level up to 4 v p-p negative going. If not used another open collector output is available with jumpers from U4-2 to pin 21 and U4-12 to pin 16. Pins 18 and 19 can be tied together and pulled up thru a 1K resistor to the +5v to provide a blanking raster input to video input 2.

CONNECTOR:

A,1	GROUND. power supply return.
2	VIDEO IN 2. 75 ohm terminated. coax ground at pin B. raster input.
3	VIDEO IN 1. Primary video 75 ohm input. ground at pin C.
E,5	+5 VDC IN. Regulated +5 VDC input.
8	INPUT SELECT 2. Open active, ground off. Switch to ground between both inputs.
9	INPUT SELECT 1. Open active, ground off. Switch to ground between both inputs.
10	KEY INPUT. Superimpose pulses pull to ground. 2 ma pull to 12V.
11	VID B/W LEVEL. 2.0 to 3.5V input for ID white to black shades.
N,12	+12 VDC. Regulated 12 VDC input.
13	VID COLOR INPUT. 3.58 mHz up to .7 v p-p. Set b/w shade to gray. G@N.
14	VIDEO OUTPUT. 75 ohm terminate at end of coax. coax shield to R.
16	HORIZ DRIVE OUT. 4V p-p 75 ohms to ext sync. camera. optional. GND @R.
21	VERT. DRIVE OUT. 4V p-p 75 ohms to ext sync. camera. optional. GND @Y
17	HORIZ OUT 1. pull down pulses to VID-3 and other modules.
18	HORIZ OUT 2. Same as above. May be used for internal raster with jumper to horiz and vert out 2 and input 2. 1K to +5.
19	VERT. OUT 2. Same as above. May be used for internal raster with jumper to horiz and vert out 2 and input 2. 1K to +5.
20	VERT. OUT 1. Pull down pulses to VID-3 and other modules.
22,Z	GROUND. Power supply and signal returns.

Make sure card is plugged in correctly before applying power. Lettered pins are on the component side and numbered on the solder side. Connector is a dual 22 pin such as the Radio Shack RS-276-1551.

HAM TV AND THE RMVHFS TV REPEATER

The RMVHFS TV group has been active for several years on the 450 MHz (70 cm) band. The TV repeater has been under construction since Dec, 1977, and is now in use as an operational repeater (first repeat Oct. 12, 1980).

Fast-scan TV is "normal" live TV, as distinguished from the frame-every-two-seconds slow-scan TV found on the low bands. The resolution and quality can be quite good, even comparable to broadcast quality.

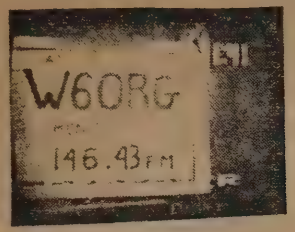
The TV repeater has its input on 439.25 MHz. It is presently located at Jim Andrews' home, north of Louisville, where work continues on it. The transmit power is 10 watts, and the antenna is a DB-411, with a semi-cardoid pattern with 9db gain. The squelch requires both a carrier and 15 KHz sync pulses, so FM, SSB, etc., will not key up the repeater. A block diagram of the repeater is found on the next page. A technical handout sheet was put together by Jim for the December meeting. For more information, get a copy from Jim.

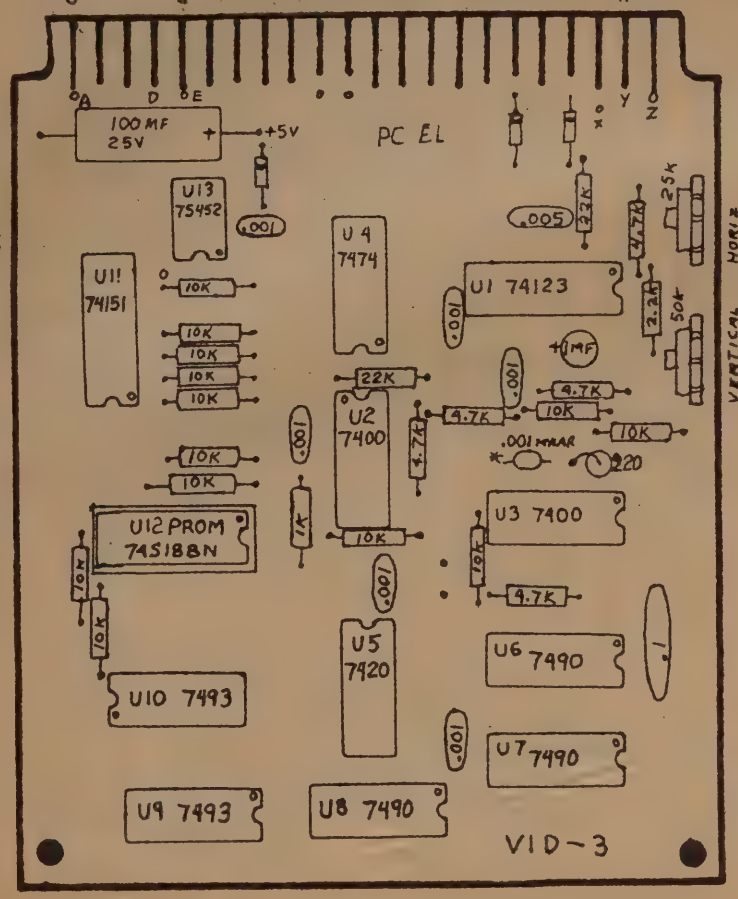
We wish to thank John Shafer, Bob O'Connell, Jim Leri, Bob Locher, Joe Woods, Al Clements and Jim Andrews for their work on the repeater, or parts thereof. Future needs include: control receiver and touchtone decoder, Circulator (present one is borrowed), Video Character Generator for ID, Color Bar generator for test patterns, and TV camera for local video test patterns. The TV repeater will require some additional work and equipment before it will be ready to move to an unattended site. A better location would enable participation by hams from the Denver area as well as Boulder.

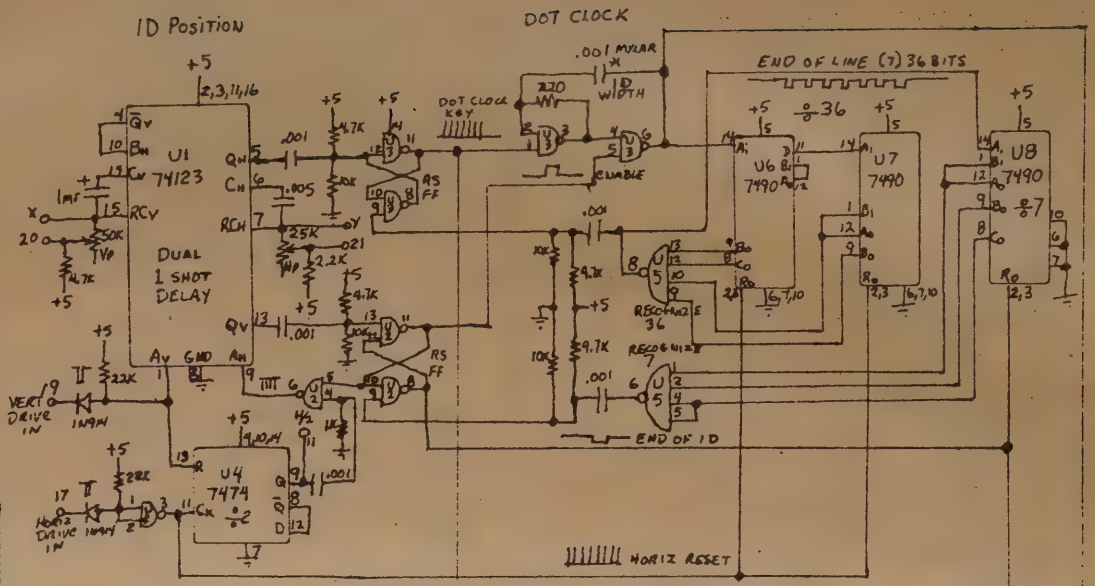
The ham TV group is generally on the air on Wednesday nights, at 9:00 PM, on the .16/.76 repeater and "70 cm fast-scan" (TV for short). Persons interested should show up on .16/.76 and ask questions, etc. It may be possible for interested hams to borrow a receive converter so that they may watch ham TV on their own set. For more information on ham TV contact Joe Woods, ADØI, 442-5664, or Jim Andrews, WAØNHD, 494-1417. Take a look for yourself.

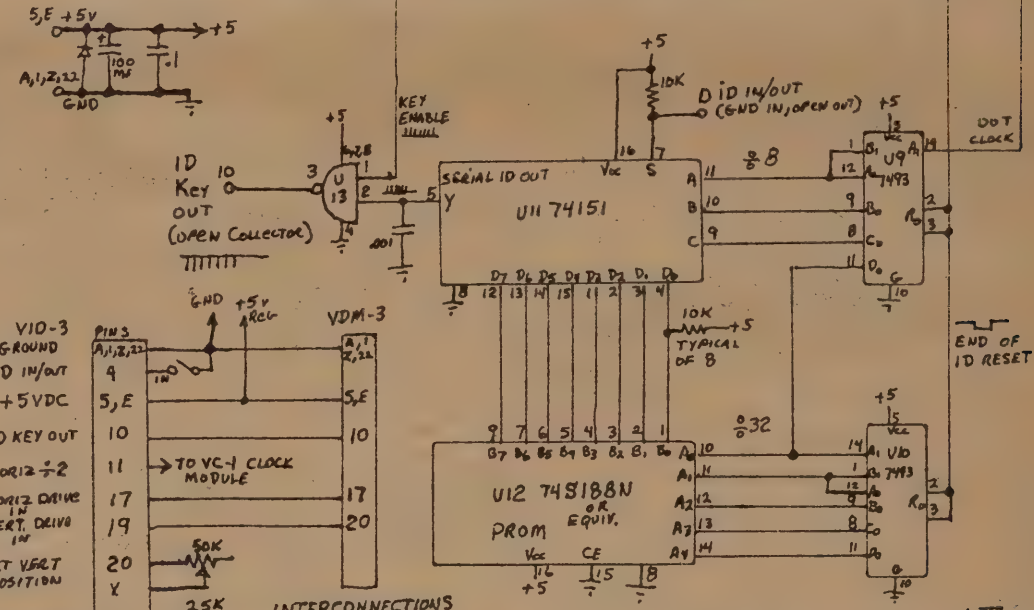
(Large parts of this article were excerpted from Jim Andrews' hand-out sheet).

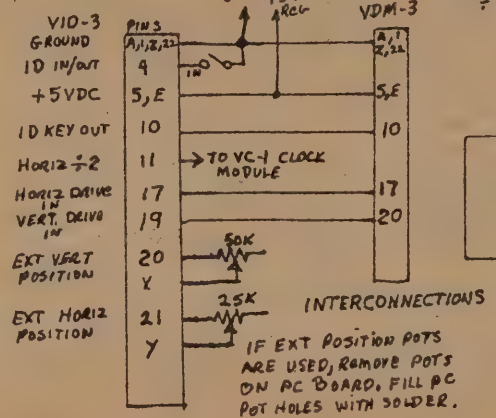
VID-3 VIDEO IDENTIFIER









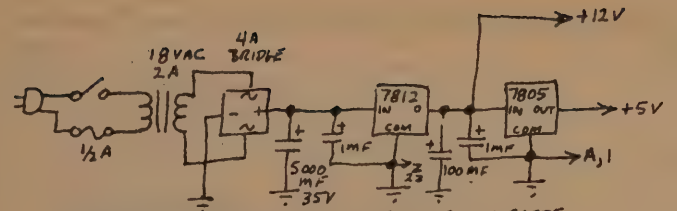


IF EXT POSITION POTS ARE USED, REMOVE POTS ON PC BOARD. FILL PC POT HOLES WITH SOLDER.

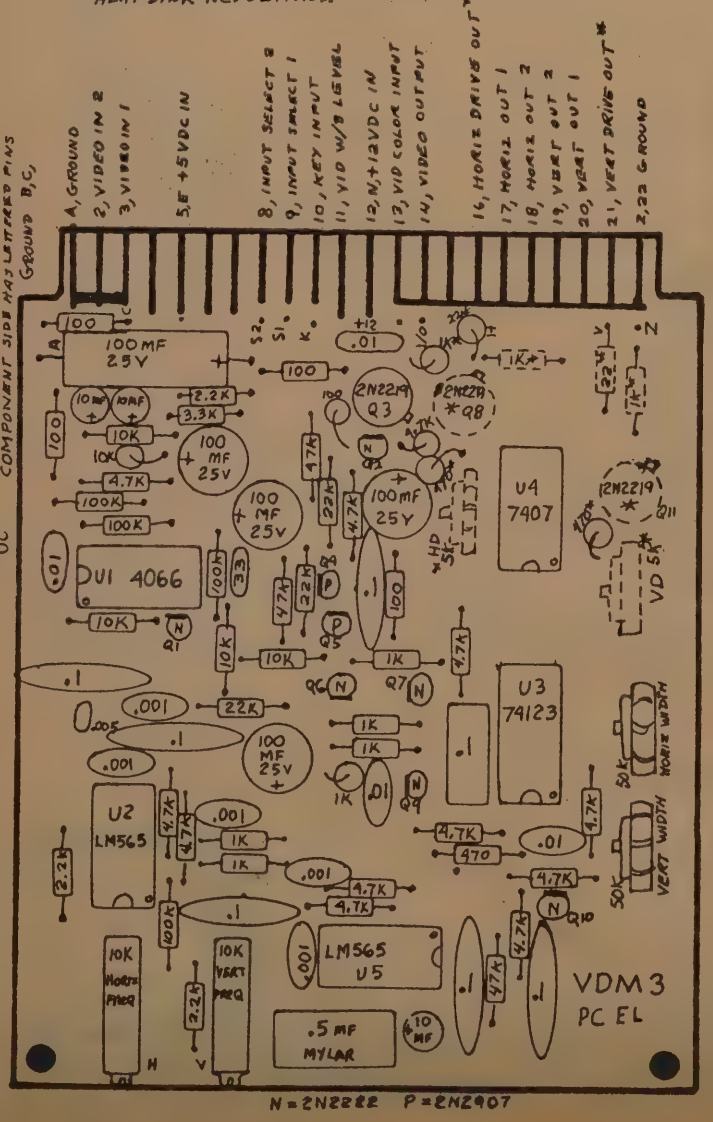
74LS MAY BE USED IN PLACE OF STANDARD 74 TTL
U2,3 = 7400 U5 = 7420 U13 = 75452 DIODES = IN914

CONNECTOR IS RADIO SHACK RS-276-1551 DUAL 22 PIN. MAKE SURE CARD IS PLUGGED IN CORRECTLY BEFORE TURNING POWER ON.

W6ORG
1-81



SUGGESTED POWER SUPPLY WITH RADIO SHACK PARTS.
HEAT SINK REGULATORS.



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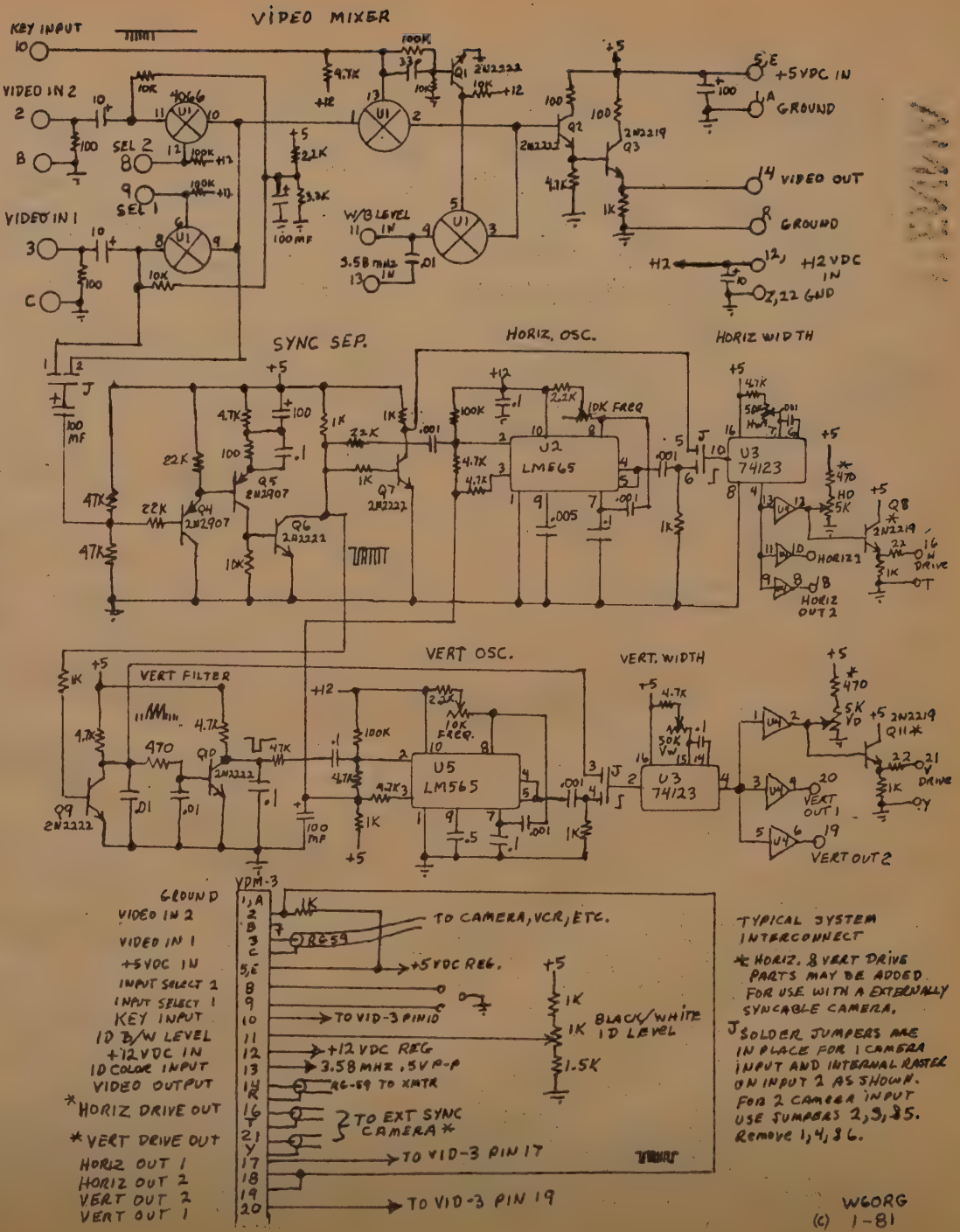


TYPICAL SYSTEM INTERCONNECT

* HORIZ. & VERT DRIVE PARTS MAY BE ADDED FOR USE WITH A EXTERNALLY SYNCABLE CAMERA.

J SOLDER JUMPERS ARE IN PLACE FOR 1 CAMERA INPUT AND INTERNAL RASTER ON INPUT 2 AS SHOWN. FOR 2 CAMERA INPUT USE JUMPERS 2,3,85. REMOVE 1,4,86.

W6ORG
(c) 1-81

1265 MHZ OMNI GAIN REPEATER ANTENNA

BY W6ORG

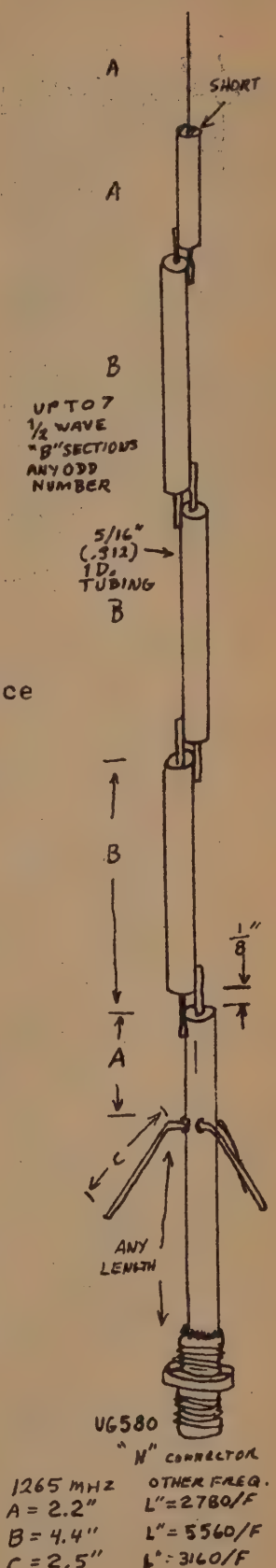
This transposed coax antenna differs from that found in the 73 VHF Antenna book in that it uses air dialectric instead of coax cable. At UHF coax cable dialectric may not be the expected .67 velocity factor for figuring lengths just as capacitors change their apparent capacity with increasing frequency. In fact manufacturers typically spec their velocity factor as being within only 10%. Full sized elements also give better radiation efficiency. At 1200 mHz the elements are so small that full sized multielement antennas are physically stable and practical.

The elements are made from 5/16 ID brass hobby tubing and 1/8" brass welding rod. Any odd number of ½ wave (B) elements may be used. But after about 7 ½ wave elements the coupling efficiency prevents getting much more gain with additional elements. 7 elements gave us about 7 to 8 db over a dipole.

Start construction with a type N female chassis connector. Solder a brass rod to the center pin as straight as possible. Next drop a 5/16 id piece of brass tubing of any length greater than or equal to 4.5" over the rod and carefully solder to the ground of the connector. Make sure the rod is kept in the center of the tubing. Transistor heatsink mounting washers make a good spacer. (see the screw insulating washers at Radio Shack 276-1371) These shpacers can also be used between elements. Next lay the next piece of tubing on a flat surface with the last piece conector side hanging over the edge. Tack solder the rods to the tubing and check for alignment and spacing. Do not allow more than 1/8" spacing between tubing or the thickness of two spacer washers. If it looks right then solder a fillet along each rod connected to the tubing for about 1". On the top section short the rod to the tubing at the top of thetubing. A 50 watt Ungar 4033-S soldering iron does a good job without over heating and melting everything. Bend the 4 decoupling radials at a 45 degree angle about ½" out from one end. Solder this in place with plenty of solder 2.2" down the bottom tubing. Use pliers to hold in place for soldering. Its a good idea to pretin each area of brass before joining.

Do not fill any gaps full or wax or other fillers as it will change the electrical length. You can put a dab of 5 minute epoxy at each rod and tubing joint for mechanical stability. Slide a piece of schedule 40 PVC 1" pipe over the antenna. Hacksaw grooves at the bottom about 1½" long for the radials. Use a end cap at the top. At the bottom use a 1" to internal threaded pvc adaptor. Screw on a short piece of metal pipe after attatching the coax and test. The pipe will make a solid clamping surface. PVC is too soft and will cold flow over time. Seal the exposed radial slots against the weather with silicon sealer. Just tape the PVC pipe joints as you may want to get into it later if you change frequency or want to try more elements, etc.

The gain of this omni vertical antenna is due to narrowing vertical beam width by phasing colinear ½ wave sections. Any metal within 1 wave length will change the pattern. A cardioid pattern of 180 degrees with some increased forward gain may be desired by spacing ¼ wave from the metal pole.



1265 MHz	OTHER FREQ.
A = 2.2"	L" = 2780/F
B = 4.4"	L" = 5560/F
C = 2.5"	L" = 3160/F

W6ORG 2-81

NARROW BAND TELEVISION NBTV

"HAS ITS TIME FINALLY ARRIVED?"

Editor's note: Very little information on NBTV has been printed in the past. With interest in Motion SSTV gaining momentum and Dr. Don Millers' MSTV experiments becoming a reality, it seems only natural that NBTV will someday find its' place in activity. Those hampered by physical distance from populated ATV areas and those just searching for a rare unexplored frontier to investigate will no doubt be the enthusiasts. The NBTV audio tape storage feature invites alot of practical applications. Experimentations on 160 meters by Australian Amateurs is encouraging. A5 MAGAZINE begins the U.S. Revival of Narrow Band Low Definition TV. We will gather and report all the available information on NBTV we can to aid in the encouragement and experimentation of this "pioneer mode". You ATV ole' timers lend a hand with ideas and updated circuit designs. Who knows what lies ahead in the near future? Imagine DX NBTV communications on a regular basis. Farfetched? Curiousity says "read on"..... WBØQCD

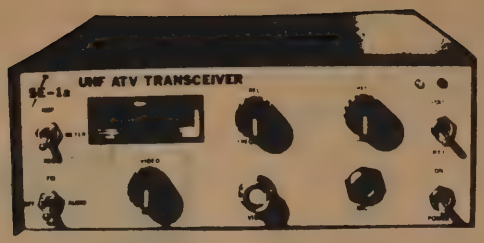
Narrow Bandwidth TeleVision Association

D. B. Pitt, Chairman
1 Burnwood Drive, Wollaton,
Nottingham, England NG8 2DJ

"WHY NBTV?" N.B.T.V. stands for "Narrow Bandwidth Television" and means the kind of television using real, moving subjects, that can be achieved within the confines of the "audio" range of frequencies (i.e. up to about 10 or 12 khz. or so) as recordable on a domestic tape recorder of modest quality. It is also referred to as L.D.T.V. or Low Definition TV which refers to the fairly small numbers of lines used in the "raster" for picture analysis and composition. The term "Coarse Raster TV" is commonly used on the continent of Europe. Early 30 line (Baird) TV was just "Television", but when 405 line transmissions began from Alexandra Palace in Sept. 1936, they were called "High Definition", so making the older system termed "Low Definition" by comparison. WHAT NBTV OFFERS To the tape recording enthusiast it offers a new use for existing apparatus (often underused after the novelty wears off), the additional equipment needed being homemade and inexpensive. Stereo recorders offer "moving" pictures with "synchronized sound". To the Radio Amateur it offers the chance of entering the field of TV technique at the minimum of expense. In addition, its starting point is technically lower than the otheravailable more popular modes, permitting a relatively painless entry to the world of Ham TV. Bandwidth occupied is modest, being about four times that of SSTV and less than a hundredth that of FSTV. Unlike SSTV and similar to MSTV it provides motion, yet like SSTV it permits the transmissions of stored material from tape. To the experimenter and constructor it offers a peculiar mixture of model engineering, electronics, and optics which is unique to this hobby. For those who have no interest in recording or transmitting, there is still the option of Closed Circuit TV images transmitted along wires in the manner of the telephone. Because of unrestricted bandwidth, such images are of frequent superior quality. THE ORIGINS OF NBTV Its roots came from the wave of experimentation associated with C. F. Jenkins, J. L. Baird/BBC transmissions in the early 1930-1935 period which offered regular entertainment in the new medium to a wide audience, utilizing standardized and commercially retailed "receivers". Because the programs were transmitted by two very powerful medium wave stations (one for the picture and one for the sound), reception took place over a huge area, including most of Western Europe. These transmissions were abruptly terminated by the BBC in September 1935 in preparation for a new "High Definition" service. No attempt was made to overlap the two services, as occurred after World War II when the 625 line transmissions began. Because of this, thousands of thirty line receivers, mostly home-built and almost all mechanical, were rendered useless overnight. To fill this gap, a few enthusiastic Ham Radio Operators applied for TV transmitting licenses so as to provide programmes of a sort, using the same standards. However, the advent of the newer systems and rumbles of iminent war in Europe combined to bring these activities to a close.

After World War II, interest in television centered on the building of receivers to display the 405 line pictures which had commenced again from Alexandra Palace. Thanks to wartime radar and other techniques, electronic TV was now reliable though expensive. Amateur TV when it arrived was based on the projection of an electronic raster onto the subject, with a photomultiplier to pick up the reflected or transmitted light. These early "monoscopes" copied high definition techniques, and stationary captions and pictures outnumbered moving and living subjects. The old mechanical techniques of disc mirror drums and screws, etc., were all but forgotten. Subsequent developments in Amateur TV have closely followed commercial practice, mostly in order to reduce the high costs, SSTV being one of the few areas of fresh thinking over the past 30 years. Work on low definition TV began in Nottingham, England when Doug Pitt (old enough to remember 30 line transmissions) collaborated with Stan Kujawinski, an enthusiastic engineer, in some feasibility studies. These experiments were by themselves not spectactular but reproved the Baird type of NBTV signal was recordable on domestic recorders and produced a clear idea of what was needed for revised standards. In early 1972, "Wireless World" published a letter from Chris. Long of Hawthorn, Australia, who, while still in high-school, had built a Blaird Televisor, experimented with various line standards and in collaboration with Dan (VK3UI) van Elkan had broadcast 48-moving lines of images on the 1.8 Mhz. band, the first mechanical TV transmission since 1932 in Australia. On the basis of that contact on the other side of the globe, Doug Pitt advertised in the then popular radio magazines for correspondents of like mind interested in "reviving" Baird-style TV. The response was encouraging and it appeared that many people had never really ever lost interest, some had continued to think of a better method of circuits while others were infatuated with the "old style of TV" and dug into the reference books. During the next two years, the circle of correspondents grew and "Idea Sheets" were exchanged constantly. By the end of 1974, some forty correspondents were assembled and it was time to consider the forming of a proper Club. THE LOW DEFINITION TV ASSOCIATION was formed in April 1975 and annual conventions are held in Nottingham. At a conference in 1978 on a motion by G. Miles, the title of the association was changed to the NARROW BANDWIDTH TELEVISION ASSOCIATION as it is known today. WHAT TO EXPECT Those old and fortunate enough to have seen old 30 line transmissions will have no dificulty remembering what it looks like. Basically, pictures are restricted to close-ups. the Definition of background is too low for longer shots. The "movement" of the photograph image enhances definition greatly. Proper lighting is a real necessity as in ATV or SSTV. The photograph above was produced by Chris. Long in the summer of 1980. It is a good example of what can be achieved if properly understood. Further information can be obtained from Mr. J. M. Wood, Inovonics Inc, 503-B Vandell Way, Campbell, CA. 95008. STANDARDS USED Baird/BBC standards; 30 lines vertical, scanned upwards, 12-1/2 picture repititions per second (12-1/2 is 1/4 of 50 (hz.) a picture shape of 7 units high by 3 units wide. It was later decided to change from 30 to 32 lines which is a binary number (2^5) to make for easier geometrical construction, as well as enable the bistable dividers to be used without modification. The picture shape is 3X2 to save bandwidth. The temptations to further reduce the aspect ratio towards the optically square shape was resisted because at the time the required minimum length of an adequate line sync. was not known. It is encouraged to work on other than listed standards such as 24, 32, 48, 64 etc., in the choice of line number for ease of geometric construction.

SUMMARY: Line number: 32, scanned vertically upwards. Picture repetition frequency 12.5hz. no interlace, right to left scanning. Picture format: 3 units vertical by 2 units horizontal. Sync. Pulses: (line frequency) minimum 5% of line duration; black Stereo Tape: Left channel - composite video; Right channel - sound OR Left channel picture; Right channel, sync pulses. A few hearty souls have built their own equipment, but most use the flying spot scanner techniques, O-Scopes & Old televsions for receivers. Membership to NBTV Association is open and based on subscription. All correspondence may be addressed to the address given at the beginning of the article. GL.



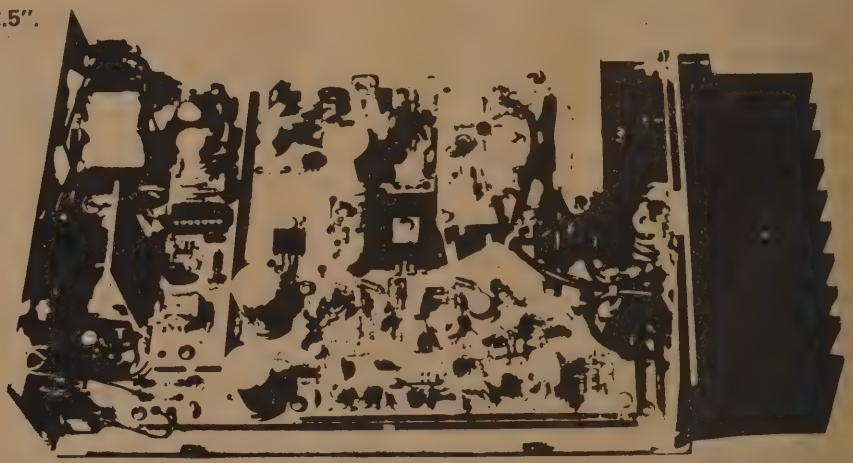
SE-1a

UHF ATV TRANSCEIVER

Add a camera, antenna, mic, 13.6vdc and a TV set for a complete fast scan ATV station.

FEATURES:

- 6 - 8 WATTS AVERAGE VIDEO RF OUTPUT.
- SENSITIVE VARACTOR TUNER OUTPUTS TO TV CHANNEL 2 OR 3.
- ILLUMINATED METER SHOWS TRANSMIT AMP CURRENT AND RELATIVE RECEIVE FREQ.
- CRYSTAL CONTROLLED TRANSMIT ON 439.25MHZ (OTHER FREQ. AVAILABLE).
- RECEIVER IS TUNEABLE FROM 420 – 450MHZ.
- STRIPLINE LINEAR FINAL WITH RUGGED MRF641 TRANSISTOR.
- AMPLE BANDWIDTH FOR COLOR.
- FRONT PANEL SELECTABLE TRANSMIT AUDIO – 4.5MHZ SUBCARRIER OR FM.
- SOLID STATE TRANSMIT/RECEIVE SWITCHING.
- ALUMINUM ENCLOSURE WITH EPOXY FINISH.
- 10.8" X 6.2" X 2.5".



$374.95 plus $4.50 UPS.

OPTIONS:

- P–1 MRF901 PREAMP ADD $25.00.
- SA–1 SYNC AMP ADD $16.00.

Florida residents Add 4% Tax.

VISA

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14061 - 111 Terrace North
Largo, Florida 33540

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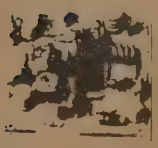
(5–9:30 PM our time)

ATV KITS AND MODULES

VM-2 VIDEO MODULATOR – Wideband collector video modulator for solid state exciters such as those from GLB and Hamtronics. Input for 4.5MHZ audio sub-carrier. 2½" x 1½"; **$13.95** kit, **$18.95** assembled.

A-2 4.5MHZ AUDIO SUB-CARRIER – Accepts audio from VCR or GLB audio processor to provide ATV audio on TV set. Has on-board voltage regulator and shielded inductor. 2 3/4" x 1"; **$18.95** kit, **$24.95** assembled.

SA-1 VIDEO SYNC AMP – Provides separate video sync gain control for VM-2 above or SE-1a transceiver. Useful when driving solid state amps. 1 3/4" x 1 1/4"; **$14.95** assembled.



TVM-1 TELEVISION MODULATOR – Adapts standard TV set so it will accept both video and audio. Uses LM1889 IC. 2 5/8" x 2 5/8"; **$22.95** kit, **$32.95** assembled.

P-1 WIDEBAND LOW NOISE UHF PREAMP – Uses MRF901 transistor to provide 16db gain and 1.7db noise figure. Covers 420–450MHZ band. Other frequencies received with change in input inductor. 2 1/4" x 1 3/8"; **$17.95** kit, **$26.95** assembled.

LA-1 UHF AMPLIFIER – Uses 15 watt MRF641 transistor with 7.8db gain @ 470MHZ. Stripline inductors with on-board pin deode antenna switching for a receiver. Designed for wideband color video with exciters such as the GLB T450L that provides up to 3 watts drive. Drilled and tapped heatsink included (4 1/2" x 1 3/4"). 1 to 3 watts drive typically gives 6 to 18 watts output. 12 – 14vdc operation @ 4 amps max. Double-sided board is 4 ½" x 2". **$69.95** assembled with test data.

PS-1 POWER SUPPLY – Converts 13.6vdc to 18-20vdc. Will power UHF varactor tuners and small relays. May be wired to supply negative voltage from +13.6vdc. 1 3/4" x 1"; **$6.95** kit.

GLB T450L TRANSMITTER – 4 1/2" x 2" RF board typically supplies 2–3 watts FM output, 1 – 1½ watts average video RF output. Changes for wideband video modulation provided. Comes with crystal for 439.25MHZ, with other frequencies available upon request. Also includes separate 1" x 4" audio processor board which supplies audio for FM modulation or for the A–2 4.5MHZ audio kit above. 12–14vdc @ 2 amps max. **$54.95** kit, **$74.95** assembled and tuned.

COMMON TO ALL KITS AND MODULES – 12 to 14 vdc operation. Drilled and plated glass circuit boards. Quality components with instructions including schematic and board layout.

AVAILABLE FROM:

Add 2% for shipping
Florida residents add 4% tax

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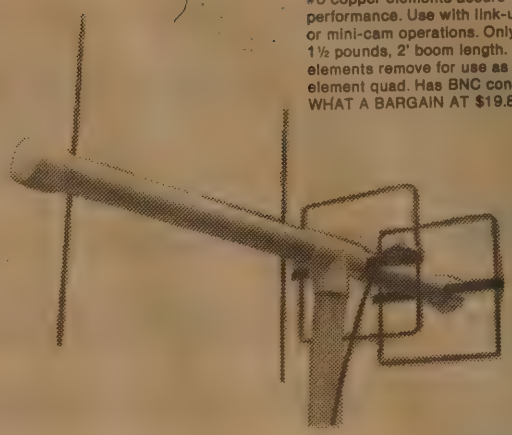
SYSTEM ELECTRONICS

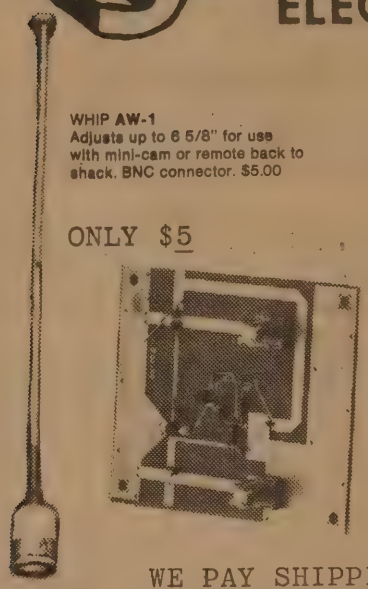
4 Element Quagi **AQ-4**
Portable, rugged, designed to get ATV out of the shack! #8 copper elements assure top performance. Use with link-ups or mini-cam operations. Only 1½ pounds, 2' boom length. Yagi elements remove for use as 2 element quad. Has BNC conn. WHAT A BARGAIN AT $19.80



$19.80

WHIP **AW-1**
Adjusts up to 6 5/8" for use with mini-cam or remote back to shack. BNC connector. $5.00

ONLY $5



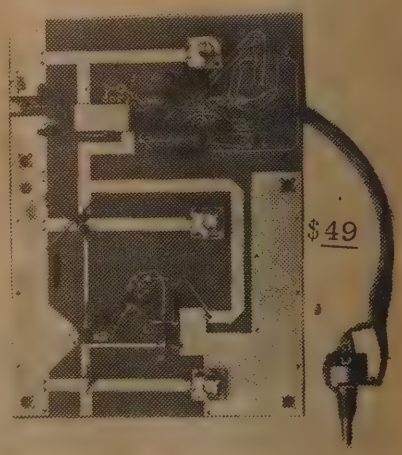
$27

PREAMP, WIDEBAND FOR ATV.
70E & 70EX Rock stable performance with MPS3702 bias ckt. works super from 0-150 degrees F. Can be powered THRU coax if mounted at ant. 14ma at 12 vdc. 50 ohms in and out. Approx 4"x4".
70E approx 16db gain 1.7nf ... $27.00
70EX approx 20 db gain .9 nf ... $57.00

PLEASE NO C.O.D. SHIPMENTS!!

ATS BOARDS ONLY.
You supply +12vdc at 30ma and save!
ATS-A MRF901 1.7db nf ... $49.00
ATS-B NEC645 .9db nf ... $74.00

WE PAY SHIPPING ! On all orders $25 or more, within USA.*******



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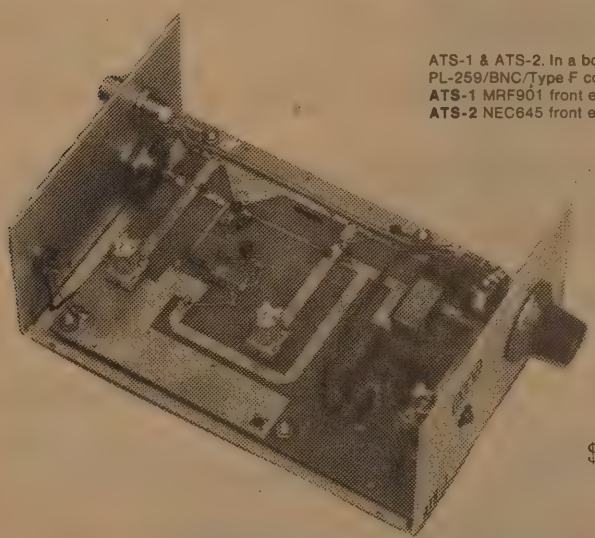
RECEIVER CONVERTERS.
All ATS converters tune 420-450mhz and converts down to ch 2 or 3. MPS 3702 bias Ckt assures stable MRF901 or NEC645 at front end. Double balance mixer along with stripline construction assures hottest performance available.

ATS-1 & ATS-2. In a box complete with 110vac supply, PL-259/BNC/Type F connectors (Type N upon req.)
ATS-1 MRF901 front end ... $79
ATS-2 NEC645 front end ... $109.00



$79

SYSTEM ELECTRONICS P.O. BOX 241
GLEN ELLEN, CA. 95442

Amateur Television Magazine

REVIEW

Mike Stone, WBØQCD

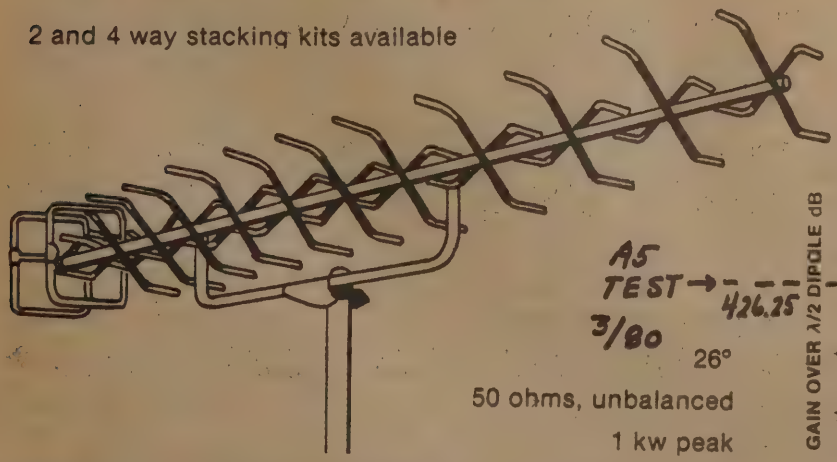
The Ultimate Antenna

420-450 MHz

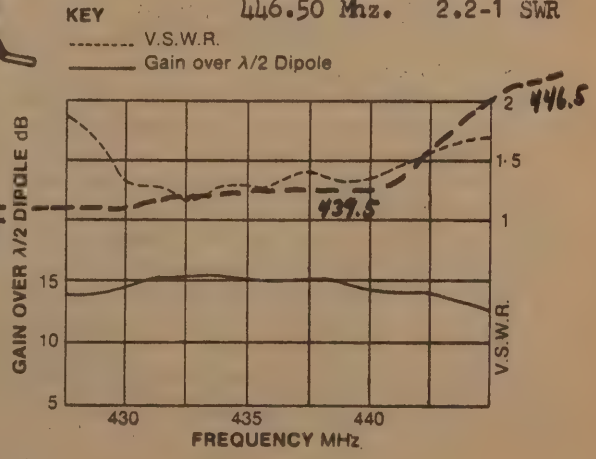
MBM 48 ELEMENT 70 CM UHF "J-BEAM" ATV ANTENNA — 15.7 db (dipole reference)

Manufactured in England, imported to the states, the "J-Beam" UHF antenna is but one of several systems designed for wideband 70 cm. use. Upon recommendation by Tom W6ORG of PC Electronics, I built a 96 element system--using two antennas with co-phasing (harness available) with 4' 9" spacing (48 inch recommended). After six months of fighting with various types of cables for my feed line (including a run of hardline with flexible RG8U on both ends and connectors that always showed bad VSWR), I decided to use a new piece of quality BELDEN 8214 RG8U type coax. The following results were obtained (using BIRD wattmeter 200-500 Mhz. slug at transmitter). The "J-Beam MBM 48/70 CM" antenna has about a 15-20 degree beamwidth (stacked array) on weak signals. The gain is so great that it becomes a "razor sharp" beam perhaps not desireable by those looking for broadness. Demonstrating almost 20 Mhz. bandwidth under 2-1 SWR-the system is ideal for ATV operation, excellent for 432 SSB activity but too narrow for OSCAR Satellites. The six-foot length of the boom takes up less space than other antennas with nearly the same gain figures. (An 88 element model with yet higher gain is available) It must be pointed out that each arm of the crossed elements represents 4 elements and each section of elements must be mounted exactly as pictured. When using phasing harnesses, the direction of the entering feed cable must flow the same direction to both antennas (not specified in instructions). Two antennas should show a very respected 18.7 dbd gain figure. My 8 watt video signal modulated is now being seen regularly with P4 quality some 41 miles away at 439.25 Mhz. simplex. The beams can be obtained from Spectrum International or PC Electronics for around $70.00 each. CU ON ATV!

2 and 4 way stacking kits available



426.25 Mhz. 1.3-1 SWR
439.25 Mhz. 1.4-1 SWR
446.50 Mhz. 2.2-1 SWR



26°

50 ohms, unbalanced

1 kw peak

length-72 in., width-18 in., height-14 in. with mtg. bar
weight-6 lbs., wind load @ 100 mph-38 lbs.

(There is also an 88 element higher-gain model available)

A5 Amateur Television Magazine
Mike Stone, WBØQCD
P.O. Box H, Lowden, Iowa 52255

Akai Actividéo: Two-In-One VCR

Akai Model VP-7300U and VU-7300 US ActiVideo System

AKAI's small VHS format portable videocassette recorder is the heart of a flexible color VCR system that includes the optional VU-7300US AC/PS/Tuner, VA-7300 AC/DC Power Supply and available compatible camera. The attractive features that become important for the Amateur ATV'er are 2-hour NICAD rechargeable batteries (1 hour with camera), light-weight 13.5 lbs., black and white or color, tear-free start stop scene changing, baterry and moisture indicators, RF modulator to drive a TV set, monitor output (video) WITH 12 VDC on the 10-pin camera connector which means true portable operating including the camera used. The unit also features "camera controlled" start-stop control relays and 2X fast-forward or adjustable speed replay including slow-motion and single-frame advancement. A handy push botton located on the front panel puts the recorder into pause and displays a very "clean" still picture to round out the rarely seen special-effects generator in portable recorders. For those not desiring a recorder with TV tuner, the savings is recognized in the special effects and portability of the 2 hour format machine. 4 & 6 hour capability is available in a newer designed unit but with sacrifice to picture quality due to the multispeed head requirement. Ruggedly built, the AKAI VP-7300U VHS recorder is great for out-of-doors recording (case available) and fits the bill for a nice addition to the FSTV "shack". ATV QSO's can be recorded and replayed into your ATV xmtr via simple interface. Mobile operation is a breeze using either the internal battery pack or an available 12 VDC cigarette-lighter plug cord. A handy counter goes to 999 and if selected has an automatic reset at 000 on rewind. An adjustable speed control assures proper syncing of the inserted tape be it homemade or commercial movies. Inputting thru the camera hookup connector has shown to allow near perfect commercial duplicating & no loss of sync on replay.

Features:

Retail price varies +/-$900.00
Dimensions-11½X4½X12¼"
Weight--13½ pounds
AGC Audio--Yes
Audio dubbing--yes
Remote control pause--yes
Auto shutoff--yes
AFC--no Skew control--no
Energy draw--10 watts
Rewind time--4 minutes
FF time--4 minutes
Tuner--2 programs same time
AC/DC Power Supply-DC recharge

An all-around "great" recorder for the A5 Amateur ATV hobbyist.

There are a couple of these units new at $689.00 Contact WBØQCD

"JUST A FEW YEARS AGO"

BILL DEWITT, W2DD

A5 MAGAZINE looks back at 1977 and CQ MAGAZINE
SSTV Editor Bill Dewitt, W2DD (May 1977 issue CQ)

In Focus

Television on the Amateur bands

Looking Forward And Backward At Picture Transmission Systems

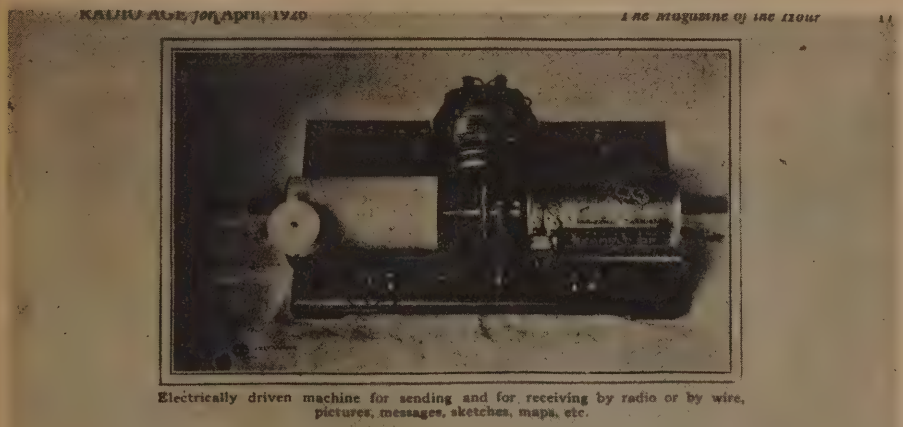
At this writing (late February), the SSTV Seminar at the Dayton Hamvention beckons to all slow scanners anxious for news of the latest innovations in the SSTV field. Year after year, new technology has been disclosed at this "convention within a convention". With this thought in mind, I found an article in an old magazine most intriguing.

It was in the April 1926 issue of *Radio Age*, "The Magazine of the Hour", that an article titled "Amateurs Take Up Radio Vision—New Field Opened by Jenkins' Invention" appeared. The author was S.R. Winters. The cover of *Radio Age* and a picture from the article are shown in the accompanying photographs by yours truly (see figs. 1 and 2).

C. Francis Jenkins had just invented a "duplex photogram machine" which could send and receive by radio or wire, copies of messages, letters, sketches, maps, pictures etc. It was a facsimile system having line reproduction capability —with no tonal scale possible except as represented by line structure.

*2112 Turk Hill Road, Fairport, N.Y. 14450.

Fig. 1—A puzzled builder labors over the next connection on the cover of Radio Age for April, 1926. This issue also carried an article on "How To Build A Short Wave Set" by a chap named Arthur Collins, 9CXX.


RADIO AGE for April, 1926
The Magazine of the Hour
Electrically driven machine for sending and for receiving by radio or by wire, pictures, messages, sketches, maps, etc.
Amateurs Take Up Radio Vision
New Field Opened by Jenkins' Invention
By S. R. WINTERS

The thrust of the article was that "now" two leading radio amateurs were going to experiment with this equipment over the 7 miles between their homes. It was also indicated that in time, they would be able to exchange pictures with hams in far away Australia.

The intrepid hams who were about to become appliance operators with their commercially made "photogram machines" were John L. Reinartz, 1QP, and George H. Pinney. Reinartz was already famous for his high frequency work, especially in connection with the McMillan Arctic Expedition.

Well, that was 51 years ago, and in my humble opinion, facsimile has never become what you'd call a front runner among the many facets of ham radio.

Winter's article was really great in many respects. It contained a prediction by Jenkins that "radio vision" would some day make it possible for us to view the Olympic Games in Europe, and that peoples of other nations would be enabled to see the inaugural ceremonies of a President of the United States! It predicted a central distributing system from which news items and movies would emanate (although this was related to a "movie house" showing of such features).

The one jarring fault in the whole story was Winter's understandable but misplaced optimism concerning the acceptance and use of facsimile by hams. Winters foresaw "an irresistible fascination in this unbroken

Fig. 2—C. Francis Jenkins, famed for his many inventions in the motion picture field invaded a new territory with his "Photogram Machine". It was NOT the Robot 400 of 1926!

ground of experimentation". He felt that Jenkins' invention would "usher in radio vision to the (then) 20,000 amateur stations.

Don't get me wrong, I *know* that many hams have operated facsimile over the years, but it certainly has had limited acceptance.

So, what's the point? Picture transmission systems have come a long way (baby) in the last 50 years. But there are many factors that determine which systems will survive. It would be interesting to trace the factors involved in this case, to see what really happened.

Meantime, isn't it great to be around RIGHT NOW while a healthy, growing, feasible, effective slow scan system is providing its "irresistible fascination" for more and more hams all over the world?

P.S. I wonder if John Reinartz and George Pinney ever delivered a report on their experimentation with the "photogram machines"!

Slow Scan Par Excellence In Chicago—WA9PDJ

It's hard to imagine a more complete or deluxe SSTV station than that of Bernie Burke, WA9PDJ. Bernie's full time occupation is running Burke Motors Inc., a Ford Agency, but slow scan keeps him busy during his non-working hours.

As you might guess after a quick look at the accompanying photographs, WA9PDJ is equipped to televise just about anything from postage stamps to people. (Those cameras mounted on vertical supports should give you some useful ideas.)

Here's how Bernie described the details of his equipment in a recent letter:

"1. Cameras are mounted on modified photo copy stands with parallel arms. One camera has a 12.5mm Macro lens, the other, a 25mm Macro lens. Both cameras can swivel up to the vertical position and turn just as if on a tripod—for live shots. In the vertical position it is possible to fill the screen with objects from one to fourteen inches square."

"2. A single desklamp with aluminized reflector is used for lighting desk top subjects."

"3. Switching allows selection of Camera 1 or Camera 2, or Broadcast video to either of the Robot 400s. A tape recorder can also be switched to either converter. The scope can be switched to either 400 and used for tuning and analyzing the picture."

"4. To show 35mm slides, a slide duplicator attachment is screwed

Fig. 3—Bernie Burke, WA9PDJ looks in complete control of all that SSTV gear. (I'd like to swap a slightly used Johnson Pacemaker for that cute little scope—W2DD.)

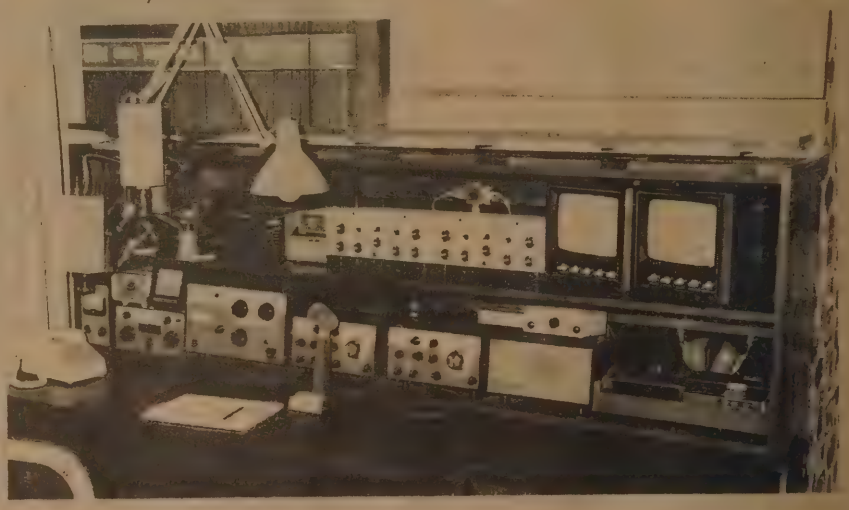


Fig. 4—An outstanding feature of Bernie's set-up is the nifty means of operating either camera in the vertical or horizontal position. See text for details.

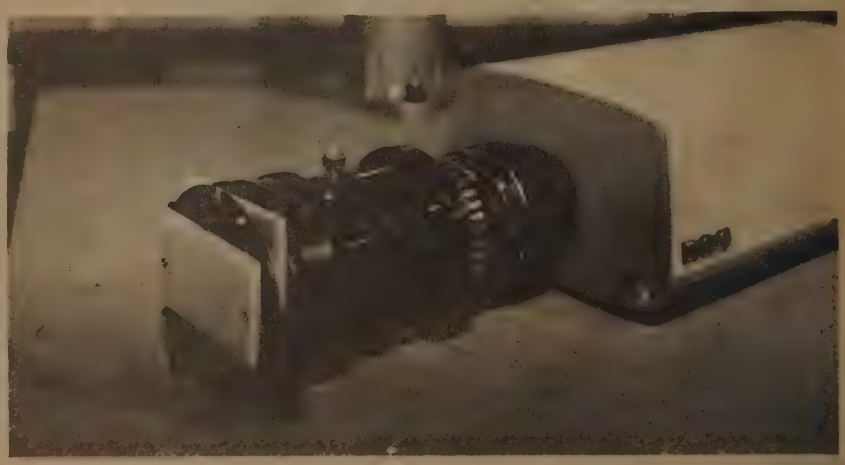


Fig. 5—Easily attached slide duplicator device is used by WA9PDJ to transmit 35mm. slides.

Fig. 6—That's Jean Nicolas, F6BDJ, backed up by a wall full of DX cards.

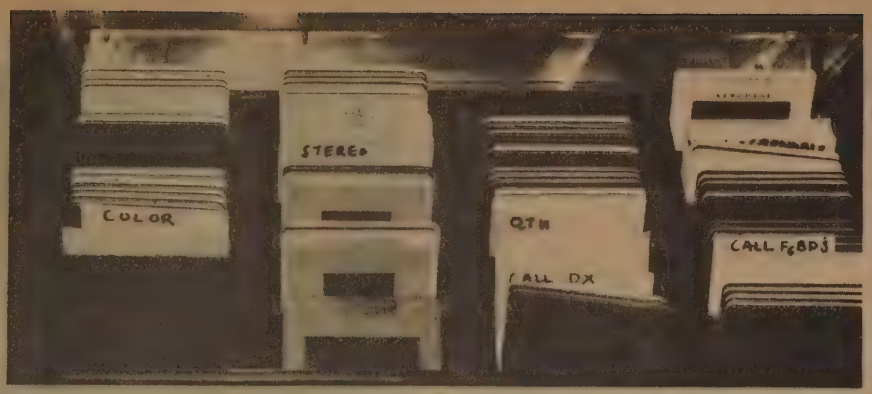


Fig. 7—A neat file box system used by F6BDJ to keep his 35mm slides in order for quick selection.

into the front of the 25mm camera lens as shown in fig. 5. The slide is backlit through a translucent screen on the slide duplicator. The front of the slide duplicator slides in and out permitting cropping slides to the square SSTV format if desired."

within reach so that you can show small items of interest to others without relocating the camera. This convenience is what is needed to get SSTV out of its hackneyed format rut!

The slide duplicator device used by Bernie is another convenience item. More details about such duplicators are shown in the pictures of F6BDJ's gear. Read on, *s'il vous plait!*

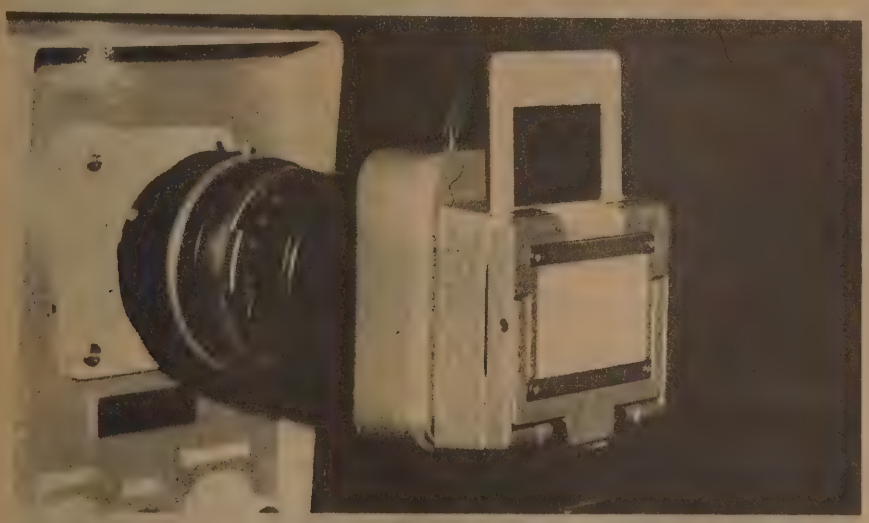


Fig. 8—With the slide duplicator device screwed into the SSTV camera lens, all you need is some backlighting.

I find Bernie's camera mounting arrangement quite intriguing because it solves two problems. First, it eliminates the space needed for a tripod, and secondly, it gets the camera

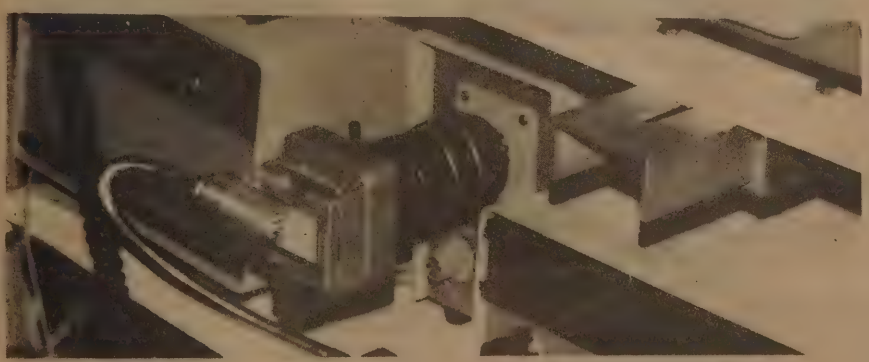


Fig. 9—Jean uses a low powered cylindrically shaped lamp to illuminate his 35mm slides for transmission.

Big Signal From Grenoble, F6BDJ

Jean Nicolas, F6BDJ, who operates a pharmacy in Grenoble, is one of France's best-known SSTV operators. Always trying something new, Jean has pioneered in color and color stereo SSTV picture transmissions. In fig. 6, you can see Jean surrounded by DX QSLs and ham gear.

I mentioned a few months ago that F6BDJ uses color slides to a very large extent as starting material for his SSTV transmissions. See fig. 7 for a look at the neat file box system used by Jean to make it easy to quickly select the wanted message or picture. Like WA9PDJ, he uses a slide "duplicator" device to image his slides on the SSTV camera vidicon. In fig. 8, you can see how the slides fit into the holder on the duplicator.

A low powered cylindrical lamp is used to illuminate the slides. This is shown in fig. 9. An "opal" glass diffuser on the duplicator eliminates any "hot spots". You can get a reasonable idea of how the duplicator attaches to the camera lens from fig. 10.

Jean has a simple but effective way of applying the red, green, and blue filters needed for his color transmissions. See fig. 11.

If *you* have a good inventory of slides (particularly close-ups!), why not follow the route chosen by WA9-PDJ and F6BDJ for a large part of their picture transmissions? Get out your 35mm camera, make up a few slides with your name, location, and other "standard fare" and you'll be all set to go!

Pennsylvania SSTVer Does Top-Notch PR Job For Amateur Radio!

Down in Lewes, (NOT Lew*is*!) Pa., Elmer Boyer, W3YAH has been doing a terrific job on ham radio public relations. Elmer decided that some-

thing needed to be done to make the public aware of the difference between Ham Radio and CB. SO, HE DID IT!

Through Elmer's efforts, a local newspaper called "The Whale" carried nearly a full page story describing all phases of ham radio in a very affirmative way.

Credit should be given to Grayson Smith, the feature writer who did such a fine job on this story. He did a very complete and coherent story that would be hard to beat! Rumor has it that he became so enthusiastic that he's going to become a ham!

Cooperating with W3YAH in this fine job of PR were: Lloyd Sherman, W3CDY; Dick DeWitt, W3WD; Earl Henson, W3ZNF; Ed Hill, W3FEG; and Hal Low, WA3WIY.

Elmer is an inveterate early-morning slow scan operator. He's on the low end of 75 every morning with early risers W3LDS, W3ATV, K3KNT, and a few others (between 6:30 and 7:30 EST).

The accompanying photograph of Elmer's well-equipped station makes me wonder just where he is going to put an SSTV keyboard he's building. (See fig. 12.) Good luck, Elmer!

Pictures We Couldn't Resist Department!

Included in the newspaper article mentioned above was a photo supplied by John Hartman, WA3ZBI, of Elizabethtown, Pa. John has a dog named Ralph. Ralph likes to operate CW and doesn't mind having his picture taken, as you can see from fig. 13. Ralph is getting interested in SSTV, so keep an eye out for him, he may show up on 20 or 75 any day now! (Now you know who they're calling when THEY SAY, "Charlie Queen, DOG-XRay!")

Get Into The Picture With A Mirror!

Want your face to appear in strange (or funny) places? You can have fun with a mirror and a little imagination. Ray Lamy, W2PBU, an active A-5 operator in Kenmore, N.Y. uses a small mirror to include his own countenance in pictures of his equipment.

Ray sets up a mirror on top of (say) his receiver in such a way that his face is reflected into the television camera lens along with the hamgear.

As pointed out by Walt Bieda, W2ELF, who pased this idea along to me, there has to be some means of illuminating your face.

Do you get the idea? There you are, with the camera essentially in back of you—it's pointed over your shoulder at your receiver and transmitter. *But,* sitting on top of the receiver is a mirror so positioned that it reflects your face into the TV camera.

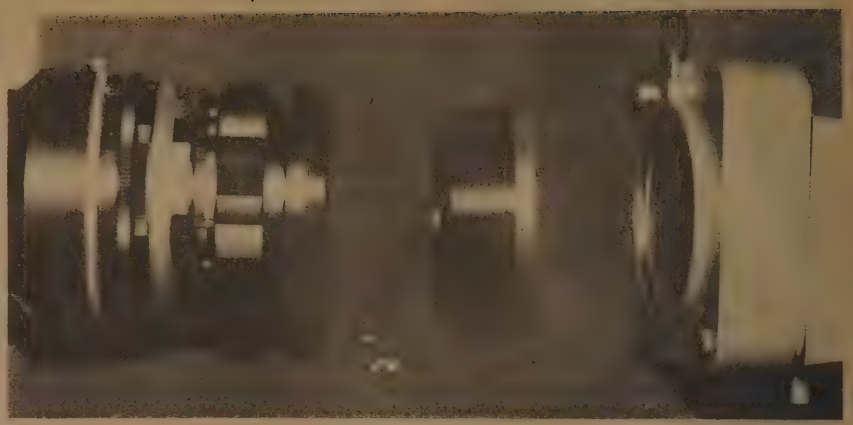


Fig. 10—More details of the slide duplicator used by F6BDJ.

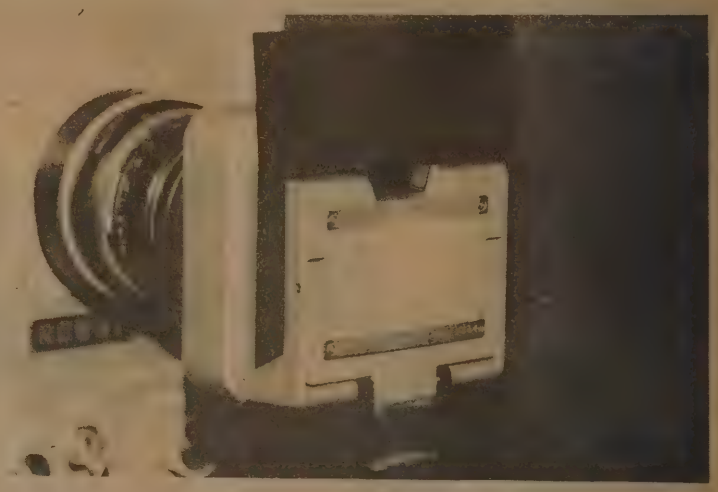


Fig. 11—When F6BDJ transmits color SSTV he uses this simple means of applying the various filters.

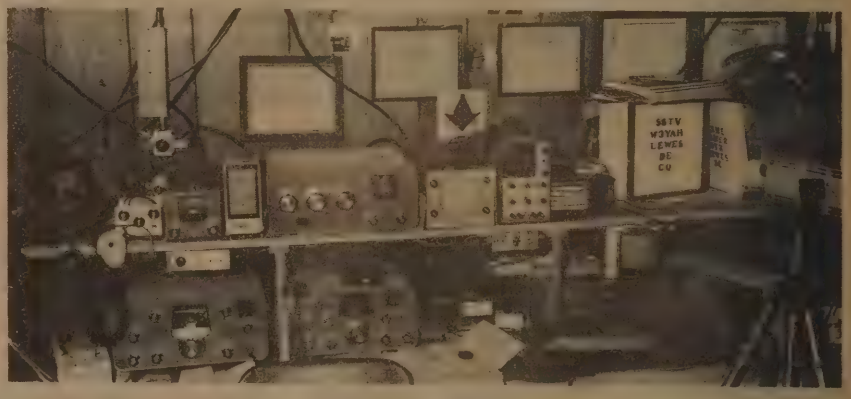


Fig. 12—Heathkit Heaven plus a Robot 400, what more could any ham ask for? This well-equipped station of W3YAH approaches W4MS for hours on the air—and that's *hard to do!*

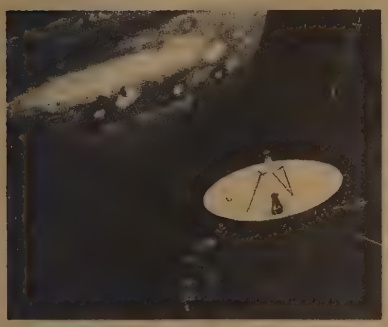
Scan Converter News From DL-Land

Thanks to G3WW, W3LY, and W4MS, here are the details on DL2-RZ's SSTV scan converter which is expected to be on the market well in advance of this publication.

Wolker Wraase, DL2RZ, demonstrated what I believe was a prototype of this scan converter at the SSTV Convention in England last Fall.

Regards, Bill DeWitt, W2DD

SSTV
now offers you more than ever before!

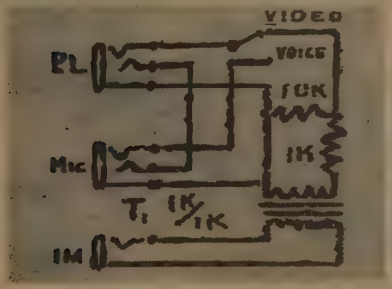


Pictures from Mars, Saturn and Jupiter.

Within seconds after these photographs were received on Earth from Voyager I and II, SSTV'ers all over the world were viewing and recording them on their own SSTV sets. Another pass-by Saturn is scheduled for mid 1981 by Voyager II. As space exploration continues to expand, this phase of SSTV activity will become increasingly exciting.

Broadcast pictures of your home brew activities.

Ever try to describe a schematic or new circuit design by voice. With SSTV you can transmit pictures of the designs and changes you are making on your station and equipment, and they can be photographed on the receiving end. It's an ideal communication system for experienced hams involved in technical experimentation.

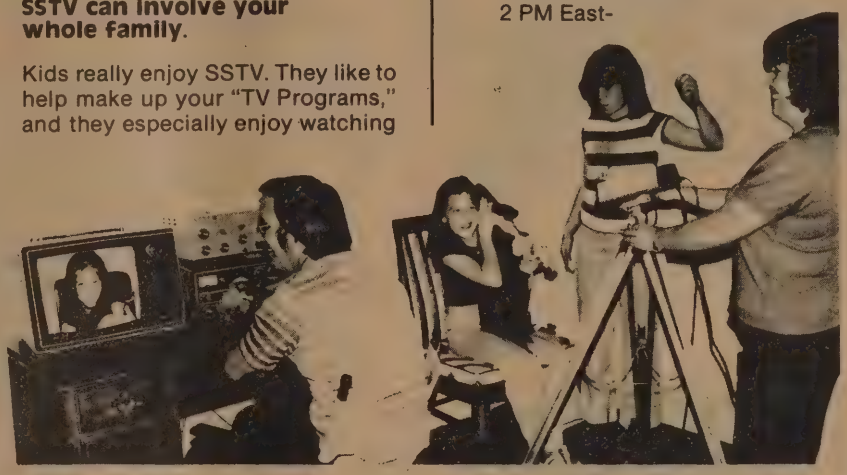


DX'ing is better than ever before.

With over 13,000 stations in operation around the world, DX activity is high. Many SSTV'ers have WAC and several have made DXCC. If you enjoy DX with radio, you'll find SSTV DX fascinating.

SSTV can involve your whole family.

Kids really enjoy SSTV. They like to help make up your "TV Programs," and they especially enjoy watching pictures come in from all over the world. If your family has lost interest in your ham activity, SSTV will rekindle that interest.



Some fast facts about SSTV.

1. Open to all amateur radio operators except novices.
2. New SSTV frequency allocations may be opening soon.
3. It is not expensive. The Robot 400 costs less than a good transceiver or terminal, and can be hooked up to any home TV set* (black & white or color). New or used CCTV cameras are cheap and plentiful.
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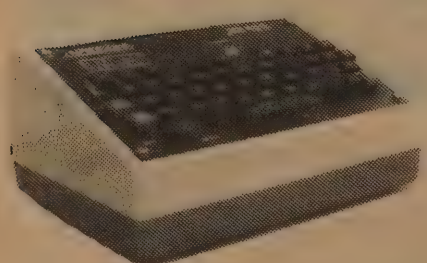

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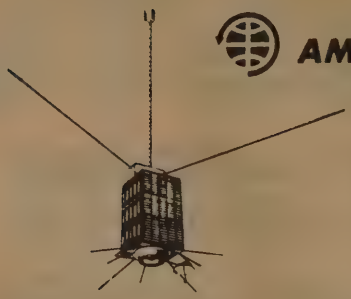


AMSAT

SSTV SATELLITE

The following item is taken from the Feb. 1981 UOSAT newsletter by Dr. M.N.Sweeting - Project Manager UOSAT, Dept. of Electronics and Electrical Engineering, University of Surrey.

Britains first amateur satellite - UOSAT - under construction at the University of Surrey is now entering the final stages before launch into polar earth orbit. UOSAT is currently scheduled for launch on a NASA Delta 2310 (two stage + three solid castor - 11 booster), accompanying a Solar Mesosphere Explorer spacecraft, at 11:19 GMT on 15 September 1981 from the Western Test Range at Vandenberg, California, USA. The programmed orbital elements are as follows;

Altitude: 530km Inclination: 97.5 degrees
Period: 98 minutes 3 pm descending node
Seperation from the Delta vehicle should occur at 12.30 GMT over the Sudan, N. Africa assuming a nominal launch.

DATA BEACONS.

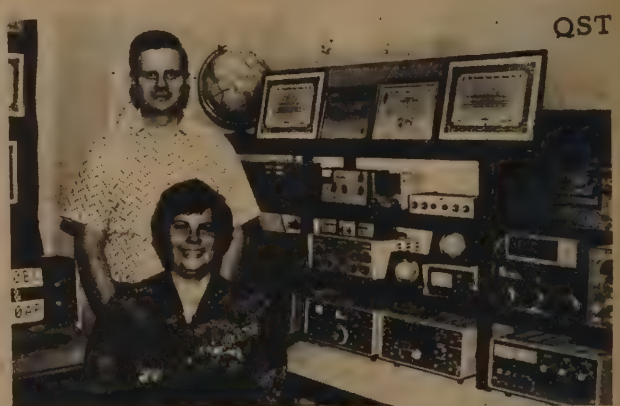
Two VHF/UHF beacons provide the primary engineering and experiment data links to the outside world and have been designed to provide a healthy satellite-to-ground transmission link to enable reliable and straight forward reception by the simplest of amateur ground stations. A standard unmodified n.b.f.m. amateur receiver and a small, fixed pair of crossed-dipoles should suffice for most orbit passes. The data sources available to these beacons are:

Telemetry - ASCII - Baudot - Morse Code
S/C Computer - Primary o/p Port - Secondary o/p Port - Speech Synthesiser
Earth Imaging Experiment - Image Data (SSTV)

GENERAL DATA BEACON.

Frequency:	145.825 MHz	Power output:	450 mW
Modulation:	n.b.f.m./c.w.	Efficiency (total dc/rf):	45%
Data format:	A.F.S.K. (n.b.f.m.)		

QST



The family aspect of DXing is not to be denied — witness Shirley, SVØBC, and OM Kent, SVØAP. The Larsens enjoy their DXing from that Greek Island in the Eastern Mediterranean — Crete. The exotic modes are their favorites, and they're readily available on RTTY, SSTV, OSCAR and ssb. The Larsens are on daily from 1430 to 1600Z and periodically can be found weekends and holidays and from 0500 to 1900Z. For direct QSLs send to Capt. William K. Larsen, Box 711, APO, NY 09291.

ENGINEERING DATA BEACON.

Frequency:	435.025 MHz	Power output:	400 mW
Modulation:	n.b.f.m./c.w.	Efficiency (dc/rf):	40%
Data format:	A.F.S.K. (n.b.f.m.)		

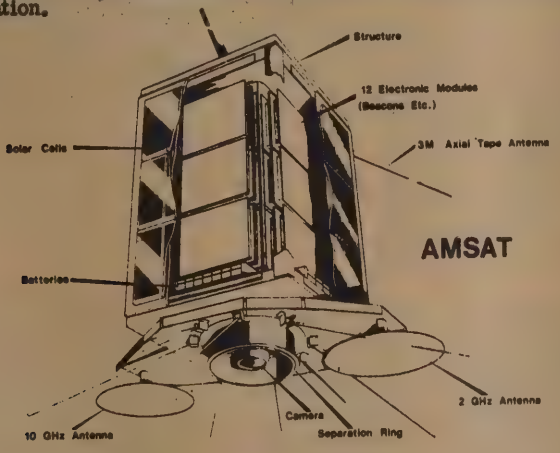
Phase-referenced beacons on 7.001, 14.001, 21.001 and 28.001 MHz will support a wide range of ionospheric experiments and observations, whilst two microwave beacons on 2.401 GHz and 10.470 GHz will encourage the study of SHF propagation and the development of inexpensive microwave satellite Ground Stations.

SLOW - SCAN TV.

An earth - pointing, solid - state charge - coupled - device, two dimensional imaging array will provide land and sea image data for digital transmission via the General Data Beacon, using minimum - shift a.f.s.k. at 1200 b.p.s. line synchronous. The image format is 256 x 256 pixcels with 16 grey levels and is stored in an on - board 0.25 M-bit solid - state memory. The camera optics are organised to cover a 500 km x 500 km area of the earth's surface yielding a resolution of around 2 km. The response of the camera is optimised to enhance land features and land/sea boundaries. This experiment can also be used to display processed telemetry and experiment data in graphical form from the on - board computer. Circuits and full details for the necessary ground receiving and display equipment (using a domestic TV) will be published later this year - component cost around £100. The BATC ar hoping to make available suitable printed circuit boards for this receive system. Details will be announced at a later date.

A digitally synthesised speech experiment module under the control of the spacecraft computer will "speak" telemetry, experiment data and spacecraft 'news' with a limited vocabulary for use with school demonstrations of space sciences. The 'speech' (in English) can be transmitted in n.b.f.m. on either of the Data beacons.

Our thanks to Dr. Sweeting and the University of Surrey for supplying the above information.



Adella Mueller, N3DQ, demonstrates SSTV to third-grade students in Hickory, Pennsylvania. Each year, Adella and her husband Art, WA3BKD, introduce students to the wonders of Amateur Radio using methods from solving simple puzzles in Morse code to listening to DX stations. Interest is always high. The secrets — presentations geared to the children's learning level and the natural affinity of youthful curiosity and Amateur Radio. QST
(photo by WA3BKD)

WOW! Get those 2 meter FM rigs wired for receive! Send pictures and reports to A5!!!

FIRST ATV COMMUNICATION?

☐ In reference to the claim for the first live two-way amateur television communication (November 1980 *QST*, page 33): Preceding this claim by more than five years, there was considerable ATV activity with Bob Melvin, W6VSV, Bob Sutherland, W6PO (then W6UOV), Ollie Nelson, W6MXQ, Bob Grace, W6VQV, myself, and others. As we look back, we were indeed pioneers because our efforts preceded scheduled commercial television broadcasting in the San Francisco Bay area.

All of our equipment was homemade, including the cameras and receivers. All activity was approximately 423 MHz. Antennas were collinears with up to 32 elements. W6VSV put the first station on the air in March 1949. — *George M. Badger, W6TC* QST

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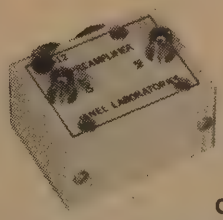

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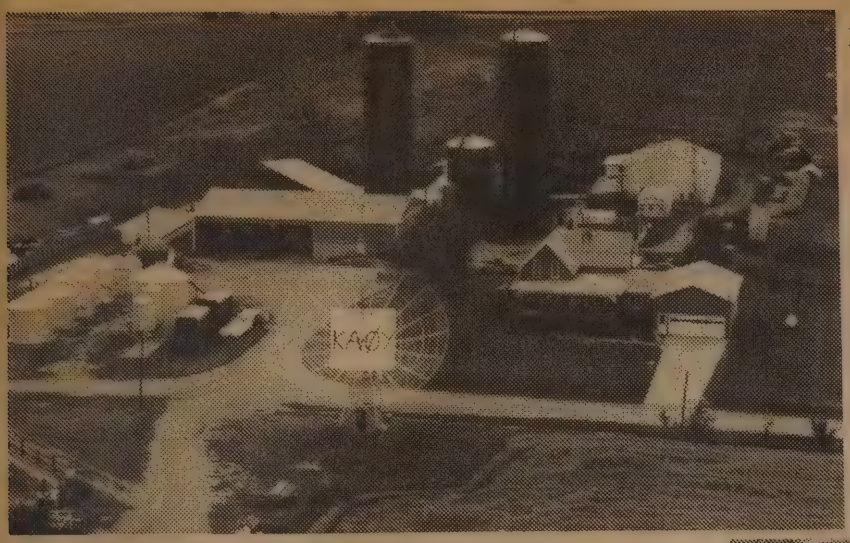
A5 MAGAZINE EXCLUSIVE INTERVIEW

KAØY
Kenneth Kucera
RR #2,
Riverside, Iowa 52327

QCD: When did you first become interested in EME/UHF work?
KAØY: I worked alot of 2 meter ssb DX for awhile, acquired #9 WAS using 8 F9FT's. VHF DX was fascinating! I naturally became interested in the higher, more challanging frequencies like 220, 432 and 1296 Mhz. I started getting the newsletters published by K2UYH and the rest is history.
QCD: Give us a description of the gear that you are currently using for your UHF DX work.
KAØY: IC211, IC701 (HF) with Hamtronics transverters for 220 and a Microwave Module for 432 Mhz. Dexcel GaASFET preamps for 1296, a homebrew mounted Parabolic 42' Dish, an assortment of VHF DX Antennas and alot of connectors!
QCD: Let's talk about EME. What are some of the contacts you've made so far? Any Countries?
KAØY: So far, 37 states, 37 DX Countries on Moonbounce alone. Over a hundred qsos like WA2FUZ, K3NSS, WD4IZR, ON4DY, OH3TH, JA9BOH, SM2GGF, I5MSH, DL7YCA, F2COR, ZL3AAD, VK5MC, F9FT and others.
QCD: I didn't realize that there is so much activity on EME. What kind of power do you guys generally run? What frequencies are used? Do you have calling frequencies? Do you buy or build your linears?
KAØY: Low power EME is possible with a large antenna system and preamps. Most of the "boys" run the full limit 1,000 watts. I personally have built up 1,000 watts on 144, 220 and 432 and am in the process of building a 600 watt linear for 1296 Mhz. That will be on the air by fall.
QCD: Give us some facts about the dish. I notice that traffic coming down hiway 218 slows down to look at the big array on the hill. How did you ever build it and what are you using to turn it?
KAØY: It's a 42' Parabolic Dish Antenna with a F/D of .55 information from Mr. Peter Carey ZE5JJ (32') and I got information out of K2UYH newsletters. Construction was all homebrew using 18 aluminum 1" square tubing ribs 21' long, 24-1" center hubs, 12,000 pop rivets (7,000 1/8" and 5,000 3/16"). If I had to do it over again I would use all 3/16" rivets. The wall thickness on each of the ribs is 63/1000 with an 18 foot square center support piece (callsign) made up of 3'X8' stock. The circular construction is also 3/8" aluminum pipe with 1/16th" aircraft cable woven in and out of the pattern ribs for added strength. A starshaped pattern was made to prevent "sidesway". The entire complex was painted with zinc chromate undercoat to arrest any reactions between the various types of metals used as a rust preventative with the finish coating of white resin gloss finish (2 coats). The antenna is fed with 1 5/8" nitrogen filled Heliax for the transmitting cable and RG8U cable for the receive line.
QCD: Impressive to say the least! What is the little trap door around the Ø and Z callletters?
KAØY: That whole section ties the ribs together. The access door allows me to change feedhorns for frequency changes and also lets me get at the dish for maintenance.

QCD; With the big a dish antenna, what are the claimed gain fiqures?
KAØY: 144 Mhz. 23 DBI, 220 Mhz. 27 DBI, 432 Mhz. 33 DBI and 1296 42 DBI. The frequencies most often used by EME'ers are 144.05--.015 Mhz., 220.100 Mhz., 432.0--432.030 Mhz.
QCD: How long does it take the dish to turn one complete direction?
KAØY: The dish has 0-90 degree elevation and 360 degrees azmidth. It takes about 5 minutes from 0-90 degrees and maybe 10 minutes for a complete spin.
QCD: How do you track the moon? It isnt where we see it with the naked eye is it?
KAØY: The moon travels about 5 degrees every 15 minutes, so it isn't a OSCAR satellite. Computer programs are available from most of the computer groups on tracking. I use my Rockwell AIM65 computer and a program written by Lance Collister, WA1JXN.
QCD: Spending 4 years with the USN, I think I recognize your dish's mounting system.
KAØY: Yes, it is a 5"38 caliber hydraulic U. S. Navy Gunmount (surplus) that I converted to AC current driving a geared down servo motor. It came out of the south somewhere, brought up the Mississippi river by barge, and moved by rail and truck to the farm. I did some labor for a friend and found it in my backyard one day on a truck. (There is another story here I think, maybe next issue of A5).
QCD: Okay Kenny, fess up! What have you got invested in this weekend project?
KAØY: Well Mike, about $1200 in the dish itself and about $700 in the concrete support legs that hold up the mount. Throw in gas pipe for the cable housing (underground), cables, pole shed house and of course excluding labor--- I'd say around $1900.00. (A few acres of corn and a couple hogs.)
QCD: What system do you use in the shack to control all this?
KAØY: The Control Center is again homebrew right down to the analog to digital converters for the readout.
QCD: I'd sure like to get you sometime and take that big dish and hook it to this little ATV converter unit
KAØY: "What would I send you, a picture of the moon?"



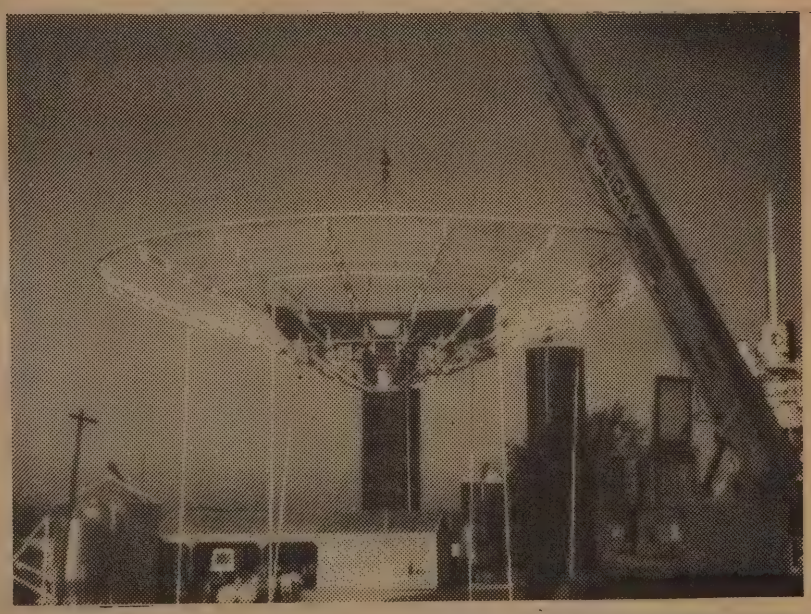
KAØY FARM COMPLEX

PUTTING UP THE MOUNT

FOUND IT IN THE YARD ONE DAY

POINTING TOWARDS IRAN

CONTROL CENTER



CRANE MOVES PARABOLIC DISH

GETTING STARTED ON RADIOTELETYPE

INTRODUCTION TO RTTY - PART ONE

This is a first in a series of RTTY articles written exclusively for A5 MAGAZINE. There have been countless books, manuals and articles over the years on RTTY Communications. Some of the better available publications are listed at the end of this article. The "series" will be broken down into five areas; Introduction to RTTY, Theory, Operations, Equipment and Uses of Rtty. We are looking for a regular column editor, experienced heavy in Rtty Communications that can report to us on a regular basis. Interested? Got a typewritter? Let us know!

MECHANICAL OR VIDEO? RTTY

The first decision you must make now getting into RTTY is wether to invest in a modern state-of-the-art video terminal system or take advantage of the "good buys" of the older reliable mechanical printers. You need two basic components getting into RTTY; the terminal demodulator unit and a printer. The demodulators for the mechanical printers turn the audio sounds coming into your rigs' speaker (like SSTV) into DC voltage impulses which keys the printer into typing. With the video route, the demodulators are usually built within the unit and take the audio signal to drive the electronic components to display the final product on a video screen. There are advantages and disadvantages between mechanical and video;

Model 28KSR

Mechanical Advantages

. Gives hardcopy print
. Autostart hardcopy
. Copies pictures

Disadvatages

. Noisy
. Requires maintenance
. Big & bulky

Video Advantages

. Silent Rtty
. Many mode/speeds
. Hooks to monitor TV
. Many option features

DS-3000 KSR

There are many manufacturer/suppliers of Video-gear. Some are listed within our advertising sections. Mechanical-gear can readily be found at "hamfests". The most popular mechanical printers used are Model 15, 28 and 32 series printers manufactured by Teletype (TM) Corp and Klienschmidt printers made in Germany. These units can now be purchased for 1/2 the price of value just a few years ago. The sought after 28 ASR (Automatic Send and Receive) used to sell for well over $500 depending upon what was under the lid. Today, we are seeing them being gobbled up from $100-300 due to the popularity of video equipment. To help your decision let's state it this way. If you find a "bargain" mechanical printer in working shape with manuals and have room in the "shack" and don't mind some noise (the 28 series are the quietest)--buy it. The end result all comes out the same and if you ever decide to go "video", you can always use the printer for your desired hardcopy messages. If you have a video monitor, want to take advantage of all the electronic "features" available such as mailbox, Ascii, speed conversion, etc. and desire "silent" RTTY, then look into the video line.

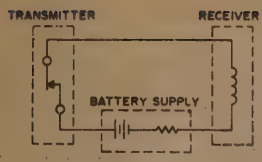


Fig. 1-1. Simple teletype-writer circuit.

The standard teleprinter code used by Rtty Amateurs is Baudot 5L although the FCC approved the use of Ascii 8-level codes in March (thanks to W4RI and others). Most modern electronic terminals use switching to allow both codes giving flexibility to the operator. The microprocessor growth in Rtty has been fantastic to say the least & with the approval of the Ascii code language, the computer has found its' place in the world of Amateur Rtty Communications. Fig. 1-2 shows the Baudot Code and impulse positions. Fig. 1-3 shows the timing circuits used as the on and off keying of the "mark and space" tones are sent. Fig. 1-4 shows the breakdown of the Ascii 8-level code. Baudot or Ascii--it is all Rtty. Check your local area to see wether there might be a VHF Rtty Repeater. Usually 146.10/70 Mhz. is used for Rtty, but a Rtty Repeater might be located anywhere. Most Rtty Repeaters are tone accessed with a 2125 hz. Mark tone so kerchunking might not work. A5 MAGAZINE will explore VHF Rtty Repeaters in future issues.

CHARACTER		IMPULSE POSITION
LOWER CASE	UPPER CASE	1 2 3 4 5
A	-	● ●
B	?	● ● ●
C	:	● ● ●
D	$	● ●
E	3	●
F	!	● ● ●
G	&	● ● ●
H	#	● ●
I	8	● ●
J	'	● ● ●
K	(	● ● ● ●
L	)	● ●
M	.	● ● ●
N	,	● ●
O	9	● ●
P	0	● ● ●
Q	1	● ● ● ●
R	4	● ●
S	Bell	● ●
T	5	●
U	7	● ● ●
V	;	● ● ●
W	2	● ●
X	/	● ● ●
Y	6	● ●
Z	"	● ●
LETTERS	Lower Case	● ● ● ● ●
FIGURES	Upper Case	● ● ● ● ●
SPACE		●
CARRIAGE RETURN		●
LINE FEED		●
BLANK		

NOTE - PRESENCE OF ● INDICATES MARKING IMPULSE
ABSENCE OF ● INDICATES SPACING IMPULSE

Fig. 1-2. The Baudot Code.

Fig. 1-3. Five-level character timing.

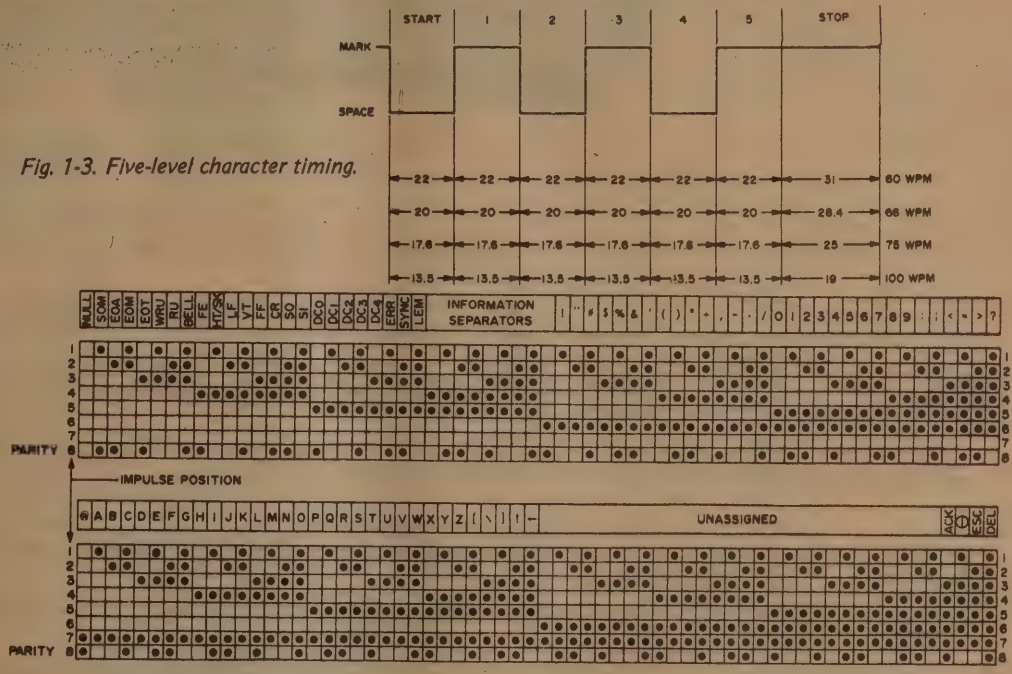

NULL SOM EOA EOM EOT WRU RU BELL FE XTASK LF VT FF CR SO SI DCO DC1 DC2 DC3 DC4 ERR SYNC LEM
INFORMATION SEPARATORS
PARITY
IMPULSE POSITION
@ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\ ] ↑ ←
UNASSIGNED
ACK BEL ESC DEL

Fig. 1-4. ASCII 8-level code.

Rtty activity is found mixed in the CW portions of the Amateur bands, with general operating frequencies of 30-40 khz. around the calling frequencies. Typical Rtty HF Autostart frequencies are 3637.500, 3617.500, 7137.500, 7117.500, 7117.500, 14.082.500 and 14.075.000 Mhz. W1AW sends regular bulletins in Rtty and now Ascii each day on 3.625, 7.095, 14.095, 21.095, 28.095, 147.555 Mhz. (See QST for times etc.) The Ascii bulletins always follow the Baudot Rtty. The next issue of A5 MAGAZINE will carry PART 2 RTTY THEORY. Support A5 MAGAZINE Rtty Advertisers!

Books on Rtty: 73 Magazine "Rtty Handbook", "Rtty A-Z" by Durward J. Tucker W5VU (CQ) from Cowan Publishing Corp., 14 Vanderventer Ave, Port Washington, NY, "The Rtty Beginners Handbook" by RTTY Journal, PO Box RY, Cardiff By The Sea, CA. 92007.

Rtty Mechanical Equipment; C. B. Goodman & Co, 5454 South Shore Drive, Chicago, Ill. 60615, Typetronics, Box 8873, Ft. Lauderdale, Fla. 33310. Lawrence Pfleger-2600 S14th St, St. Cloud, Minn. 56301. ADM Communications, Inc.-1322 Industrial Ave, Escondido, CA. 92025. NY Atlantic Surplus Sales, 3720 Nautilus Ave, Brooklyn, NY 11224.

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Pacific Palisades, CA.
90272

Mike Stone, WB0QCD
VHF RTTY NEWS
P.O. Box H
Lowden, Iowa
52255

Mike,

I am introducing to the Amateur Radio RTTY market a new RTTY program for the Apple II computer. The major feature of this program is that no hardware interface is required between the Apple II and the transmitter/receiver (other than a resistor to prevent overdriving the transmitter mike input). The receiver audio is connected directly to the Apple II cassette input and the transmitter mike input is connected (through a resistor) to the Apple II cassette output. That is all there is to it!

The program will copy and transmit 60, 67, 75 and 100 WPM Baudot and 100 Baud ASKII. Receiver tuning is unique. The Apple II hi-resolution graphics is used to display the received Mark and Space tones. Then, either the receiver is tuned to center the Mark and Space around the Mark/Space selection criterion or the selection criterion is centered (via the Apple II arrow keys) between the received Mark and Space. This scheme allows fast and accurate tuning.

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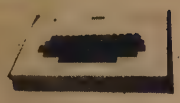
The program will operate on the Apple II or Apple II PLUS, DOS 3.2 or DOS 3.3 and requires at least 32K memory capability. A disk containing the RTTY program and the MESSAGE creation program sells for $25.

I have enclosed a copy of the instructions that is included with the program disk.

Yours truly,

G. W. Egbert
W0MMM

FOLLOWUP ARTICLE
IN NEXT ISSUE



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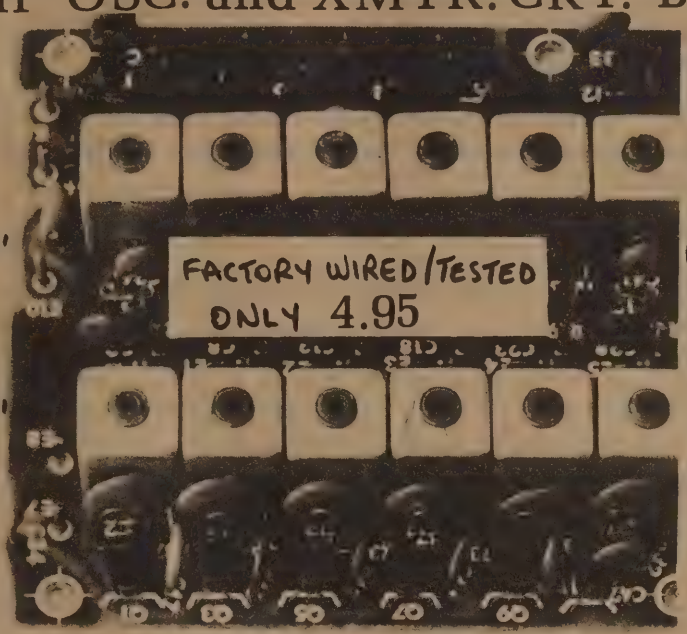

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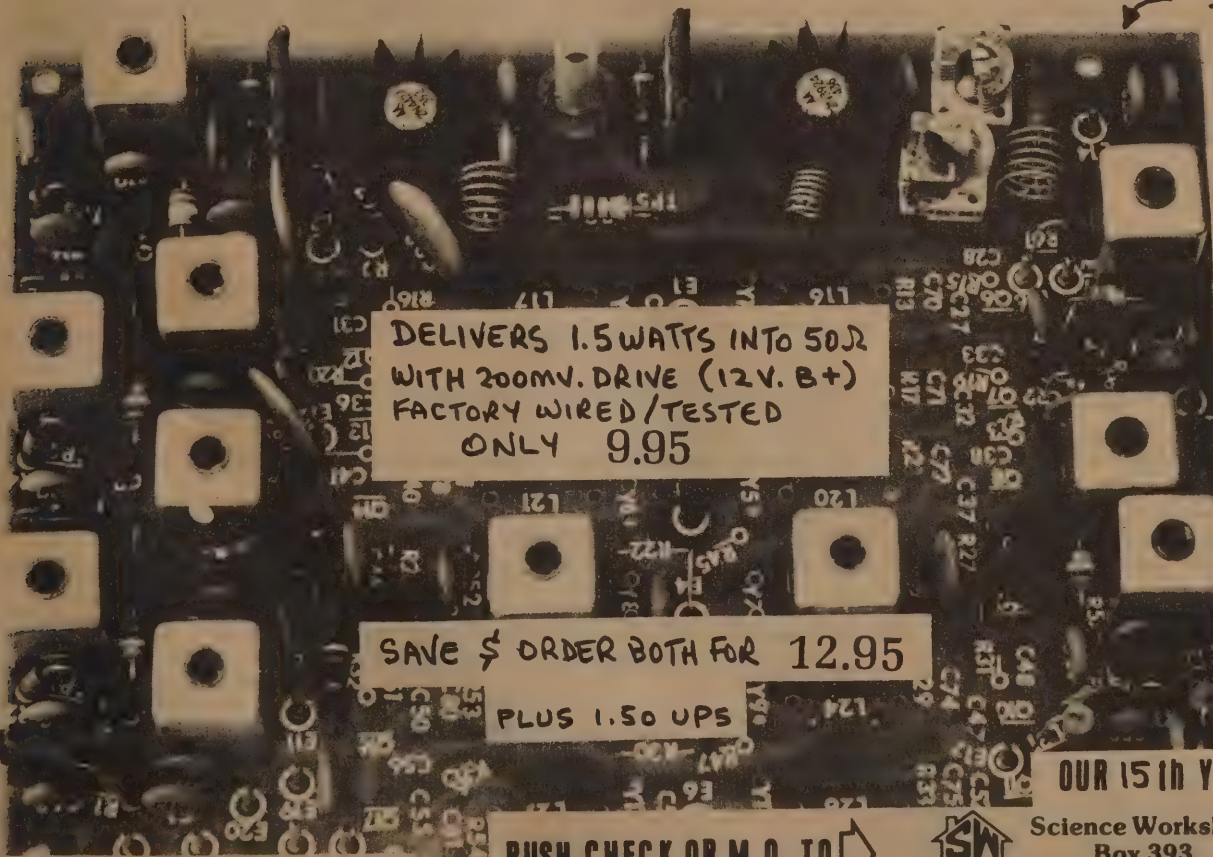

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APPROX. VOLTS

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UHF

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R47M10, R47M13, R47M15

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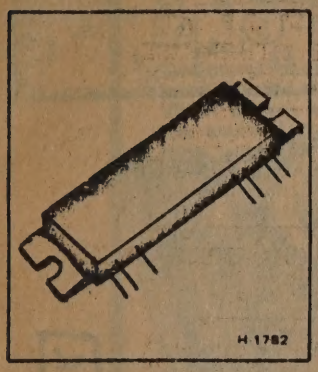

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For 12.5 V Operation

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- High power output
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- High efficiency
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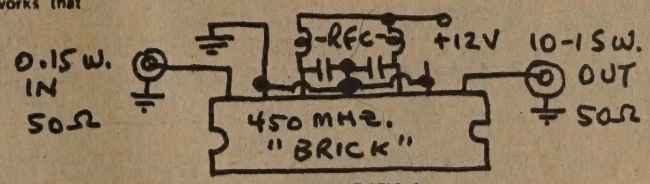
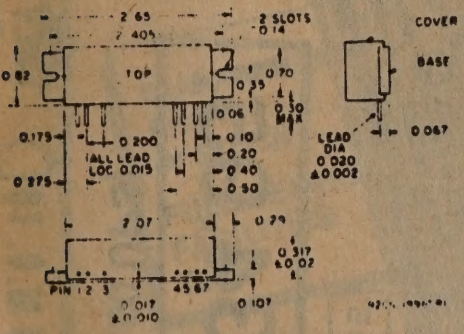
*Formerly RCA Dev. Nos. TA8712, TA8713, and TA8428, respectively



MAXIMUM RATINGS, *Absolute-Maximum Values:*

		R47M10 R47M13 R47M15	
SUPPLY VOLTAGE	V_{CC}	15	V
GAIN CONTROL VOLTAGE	V_{CON}	15	V
INPUT POWER WARNING! DO NOT EXCEED!	P_{IN}	200	mW
STORAGE TEMPERATURE RANGE		−35 to 100	°C
OPERATING TEMPERATURE RANGE		−35 to 100	°C

DIMENSIONAL OUTLINE



TERMINAL CONNECTIONS

PIN NO.	FUNCTION
1	RF OUTPUT
2	GROUND
3	SUPPLY VOLTAGE (+V_{CC})
4	GROUND
5	GAIN CONTROL VOLTAGE (+V_{CON})
6	GROUND
7	RF INPUT

WARNING: The ceramic bodies of these devices contain beryllium oxide. Do not crush, grind, or abrade these portions because the dust resulting from such action may be hazardous if inhaled. Disposal should be by burial.

MOUNTING INSTRUCTIONS:

The module should be mounted on an aluminum (or equivalent) heat sink with recommended surface finish of 0.002 inch/inch. Two 6-32 screws can be used, with torque not to exceed 20 inch pounds.

When incorporating RCA Solid State Devices in equipment, it is recommended that the designer refer to "Operating Considerations for RCA Solid State Devices", Form No. 1CE-402, available on request from RCA Solid State Division, Box 3200, Somerville, N.J. 08876.

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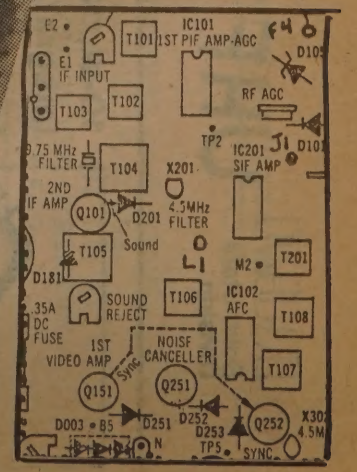
INSTR. SUPPLIED ON HOW TO CUT OUT THE VIDEO, AFC AND SOUND SECTION (4.5 BY 5.5 IN.) INTACT!



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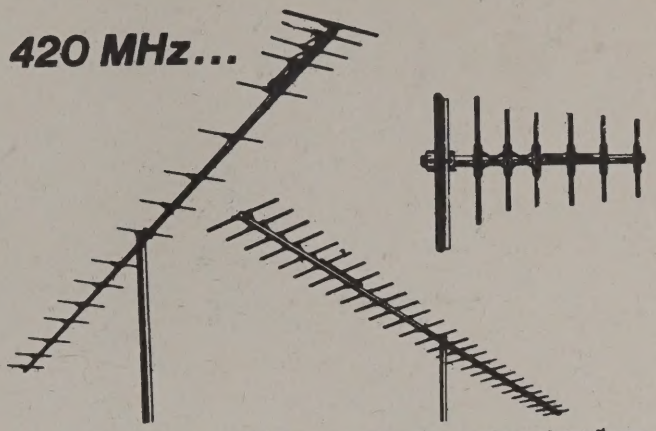
Two-meter beams deliver maximum gain and clean patterns, with VSWR of less than 1.2:1 across the entire 144-148 MHz range. High grade insulating materials, weather-resistant aluminum boom and elements. 12, 14 and 16-element beams make outstanding moon-bounce building blocks.

16-Element
KLM-144-148-16 $99.95

Gain: 14.8 dBd. Beam width at 3 dB pt.: 16 degrees. Feed Feed impedance: 50 ohm balanced (KLM 1:1 Balun, 144-148-50 optional). Boom dia.: 1½". Boom length: 20.66'. Max. mast size: 1½". Center mounting. Wt.: 10 lbs.

420 MHz...



A versatile series of KLM beam antennas in a variety of configurations: broadband rear-mount type for horizontal or vertical arrangement, ultra-high-gain DX type, and optimized long boom Yagi for narrow-band use. All have VSWR less than 1.2:1 across the entire band. Maximum mast size: 1½"

6-Element
KLM-420-470-6 $26.95

Frequency: 420-470 MHz. Gain: 8 dBd min. F/B ratio: 20 dB min. Beam width at 3 dB pt.: 30°. Feed impendance: 50 ohm balanced (Balun 420-470-50 optional). Boom dia.: 1". Boom lgth.: 2'. Mounting: End or center; horizontal or vertical. Weight: 1.2 lbs.

14-Element
KLM-420-470-14 $46.95

End mountable; vertical or horizontal polarization. Excellent for repeater control. Frequency: 420-470 MHz. Gain: 13.7 dBi. Beam width at 3 dB pt.: 24°. F/B ratio: 20 dB min. Feed impedance: 50 ohm balanced. Boom dia.: 1". Boom length: 4.75'. Wt.: 4 lbs.

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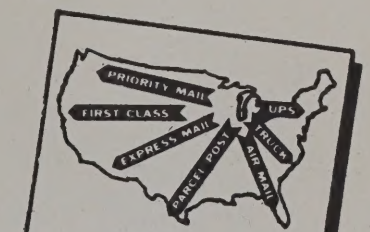

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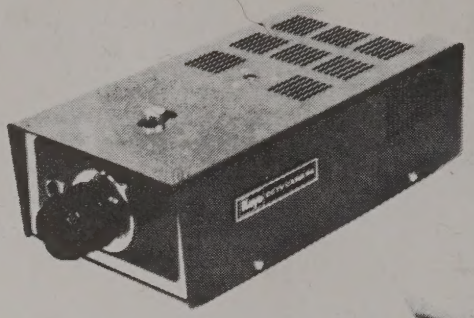

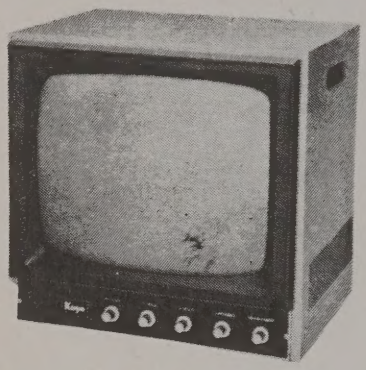

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